

In This Issue—*Publicity for Your Business*

MOTOR AGE

Volume XXXVI
Number 22

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, NOVEMBER 27, 1919

Twenty Cents a Copy
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FYRAC SPARK PLUGS

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Live dealers sell spark plugs that are advertised, because they are easy to sell. They find that advertising saves time in making a sale; that three sales can be made, earning three profits, in the same time it takes to make one when they are trying to sell an unadvertised article.

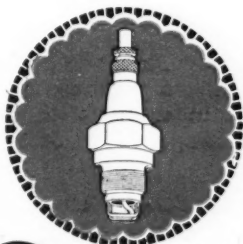
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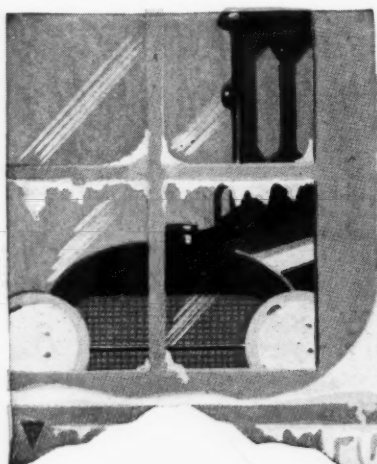
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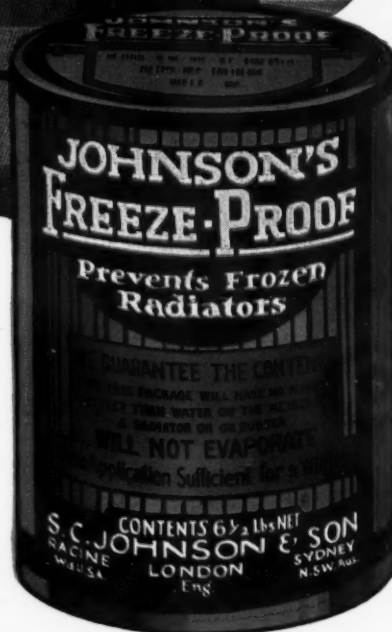


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the Car !!*

USE JOHNSON'S FREEZE-PROOF, then forget there is such a thing as a frozen radiator. Leave your radiator uncovered on the coldest day—leave your car at night in an unheated garage—**it can't freeze.** You can never be sure of alcohol or any other product which evaporates with the water. Besides, the price of alcohol makes it practically prohibitive for the coming winter.



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Johnson's Freeze-Proof is the logical anti-freeze preparation to use. It is inexpensive—does not evaporate—is non-inflammable—easy to use—and guaranteed. One application will last all winter unless the solution is lost through the overflow pipe or leakage.

Johnson's Freeze-Proof is a great time and money saver. Your cars and trucks will always be on the job and in the coldest weather it will be "Business as Usual" for you.

One package will protect a Ford to 5° below zero, one and a half packages will protect a Ford to 30° below zero and two packages to 50° below zero. For larger cars or to protect to a lower temperature, use additional Freeze-Proof according to the scale on the package. Cost \$1.50 per package in the U. S. A. East of Rockies.

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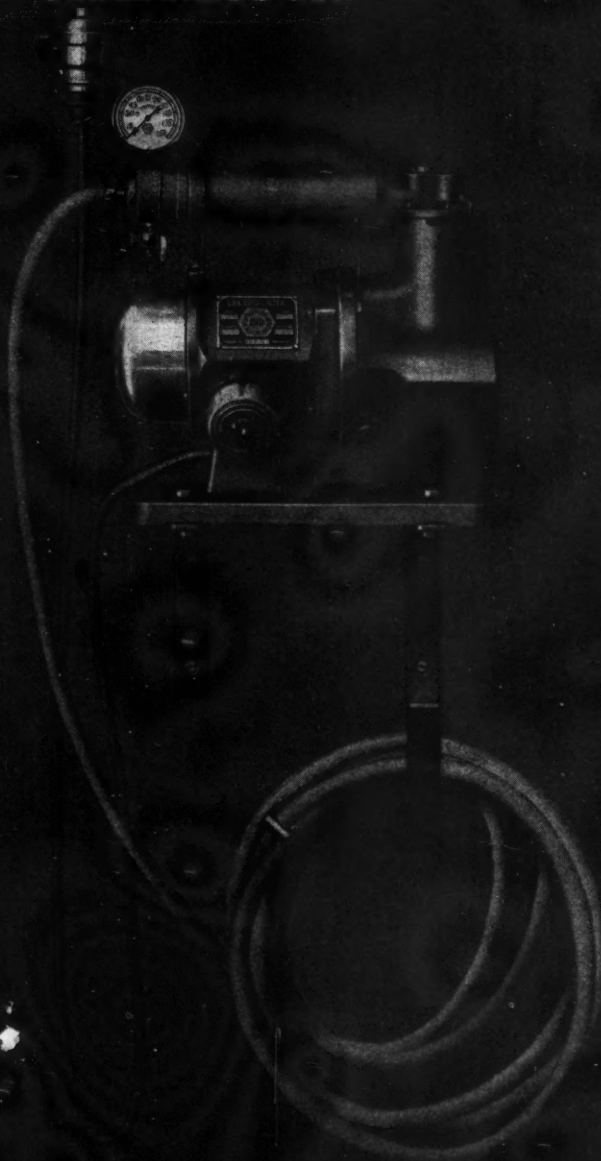
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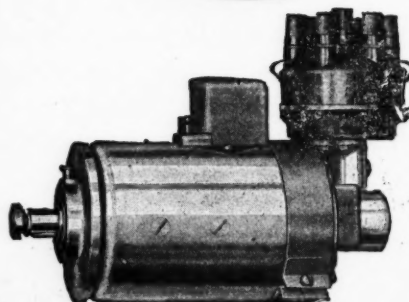
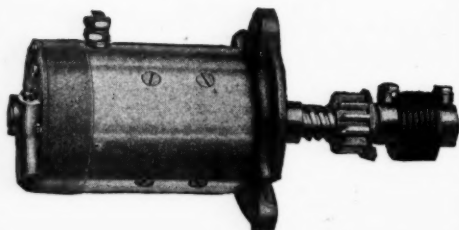
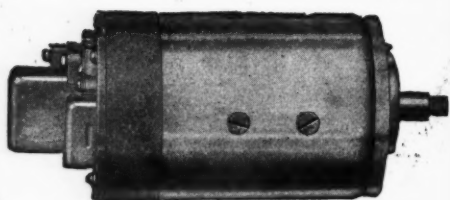
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MOTOR AGE

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The proved service capacity of "NORMA" equipped magnetos and lighting generators—their high factor of safety to which the "NORMA" factor of safety contributes bearing dependability—have made them to be the accepted standards with builders who place serviceability before all else.

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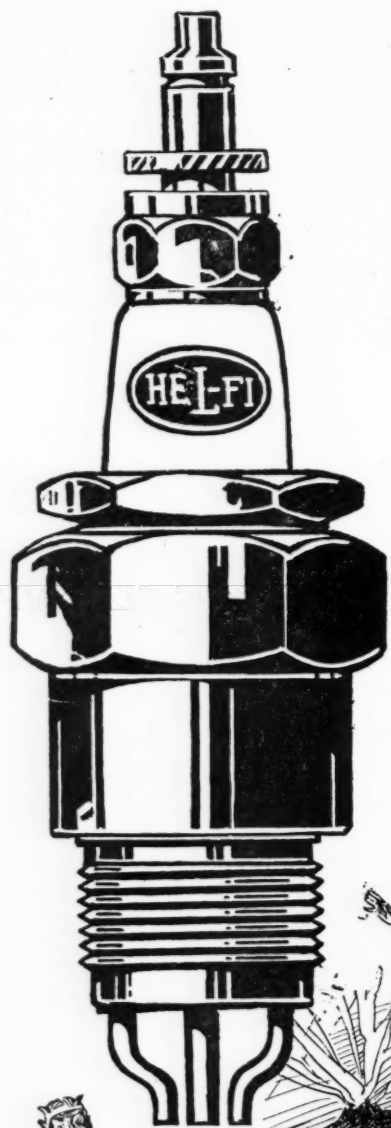


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NEW YORK

Ball, Roller, Thrust and Combination Bearings



HEL-FI SPARK PLUGS

true to their purposes, deliver a constant, blistering hot spark — reduce carbon troubles — enable a saving of gasoline and give the motor a fair chance to produce its full efficiency.



"THERE IS A
HEL-FI
FOR EVERY MOTOR"

THE HEL-FI COMPANY, BELVIDERE, ILLINOIS, U.S.A.



The Publisher's Service Station

Rendering Service to Help You Render Service



What the Editors of Motor Age Were Thinking About Seventeen Years Ago

(Reprinted from the Nov. 6, 1902, issue)

"THE SELLERS MOST VALUABLE OPPORTUNITY"

"Within the past year or so the knowledge of the general public concerning automobiles, their parts and accessories has advanced to a remarkable degree, until it is no longer uncommon for a would-be customer to know as much or more about the machine or fitting he is looking at, from a technical point of view, than the salesman who is showing them. This is due in large part to the close reading of publications devoted to the sport and trade. It is either the special opportunity or the complete undoing of the seller.

"However well posted a certain reading and thinking portion of the public may be, there remains a larger number which must continue to depend upon the word and reputation of the house of which they buy and of the man or firm behind it. The gaining of the confidence of these people and the holding of it by tact and judgment is an abiding necessity of automobile salesmanship. None can either gain or hold this confidence by half-hearted dealing.

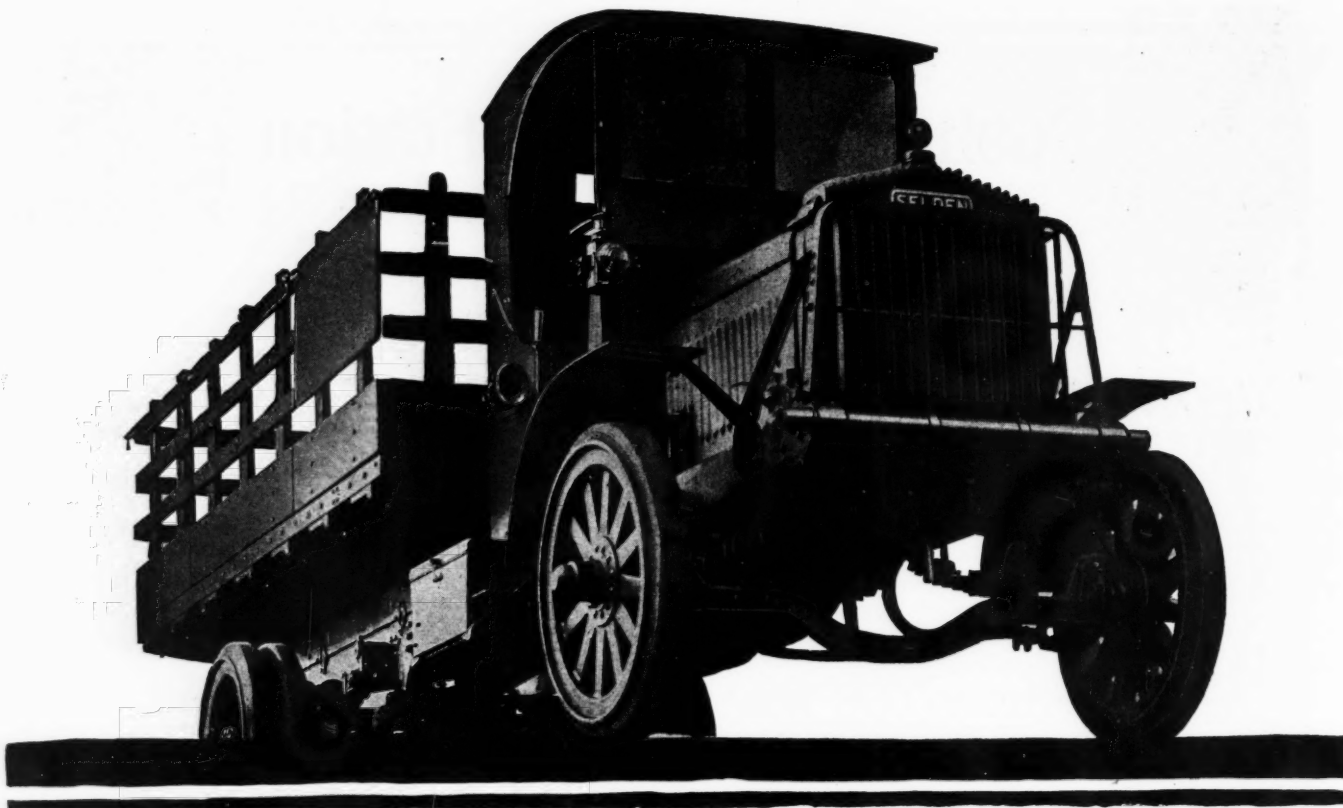
Haggling over price, "beating down," and meeting sharp practices with their like are no longer any part of the game. The taking of fair and legitimate profits, the one-price idea impartially held, the treating of

all customers alike, the praising of one's own stock without at the same time condemning everything else—these are the keynotes of the winning trade policy of the future.

"This manner of doing business brings about a confidence between customer and retailer which did not and could not prevail under the old plan. By virtue of it the buying public acknowledges the upright purpose on the part of the tradesman instead of constantly suspecting him of seeking unfair advantage through his special knowledge of the articles dealt in.

This change has been wrought largely by the seller himself, and it is equally certain that the public's future disposition in the matter is in his own keeping.

"The most successful retailers of the future will be those who keep the confidence of their clientele by allowing the latter to share in the special advantages secured by their own situation at the four corners of the industry. This will, in other words, take the interested public into a certain partnership with the trade. It is an acknowledgment of the value of the right sort of patronage—to be recompensed in regular and substantial ways."



"We Will Sell All You Can Give Us"

"Send along others as fast as possible." "The new and splendid method of flexible frame construction and absence of rivets provide abundant protection against brutal usage." "You have given us so many talking points of real merit that I don't see how any Selden salesman can help but win sales in competition with any truck in the world." "The more I see of the new Selden model the more enthusiastic I become." "I am writing all my dealer friends and telling them to hurry and get into the Selden organization if they can." "We will show our appreciation of the new Selden model by sending you a deluge of orders."

These expressions of appreciation of the new 3½ Ton Selden Model are selected at random from the deluge of letters and telegrams which we have received from Selden dealers in all parts of the country.

Months ago when the Selden Special (1½ Ton Model) met with the complete and instantaneous acceptance which it did, we did not believe

it possible for a motor truck to be more enthusiastically received.

But the new 3½ Ton Selden Model has been accepted by Selden dealers and delighted owners with greater enthusiasm than even the "Selden Special." It is an assured success. Selden dealers are already profiting by enormous sales in their territory.

DEALERS: If Selden Trucks are not at present being sold in your territory, write or wire us for our sales proposition.

1½, 2, 3½, 5 Ton Models—All WORM Drive

SELDEN TRUCK CORPORATION, Rochester, N. Y., U. S. A.

Selden Motor Trucks

MOTOR AGE

Let Your Local Newspaper Help Your Business

*It Wants To, If You Will Give It a Chance
To Do So*

*Here Are a Few Pointers on How You Can Get Publicity
of the Right Kind*

By LAMBERT G. SULLIVAN
(Motor Age Editorial Staff)

THE other day an officer of the National Automobile Dealers' Association said to me:

"Why don't you write an article for MOTOR AGE telling dealers how they can take advantage of newspaper publicity? You ought to know how they can get it and I find in my associations with them, that there are mighty few dealers who know."

It is a great deal easier to ask than it is to do it. But with the experience of more than a decade of active newspaper work before joining the MOTOR AGE staff, perhaps I can give some pointers to readers of MOTOR AGE in how they may take advantage of a very valuable aid to their business which is so freely offered to them by nearly every newspaper in the United States.

Not that I am going to tell you how to get a lot of "free publicity." That expression is just as abhorrent to every reputable newspaper man as "free service" is to the automobile dealer. In fact, there isn't any such thing. You may think that you are getting "free publicity" in some cases, but if you count up, you will soon find out that you are paying a pretty high price for anything of the sort. Getting publicity means

Editorial columns of the local newspapers are legitimate and profitable means for the dealer to keep his name and that of his car before the public of his territory. The degree in which he is successful in getting into the paper and the amount by which he is profitable to him depends chiefly on the skill with which he presents the items and the judgment he uses in selecting the subject. Mr. Sullivan, for many years was automobile editor of a Chicago daily, noted for the value of its motor news.—Editor.

real thought, real work. That is, if it is going to be of any value to you.

Newspapers can be roughly divided, on the automobile question, into two groups. In the first group there are the papers which actually, although they do not come into the open and say as much, give "publicity" in direct proportion to the amount of paid advertising they get. Then, in the second group, are the papers which try hard to make their automobile columns real news, of real value to their readers.

You Pay For "Free" Publicity

With the first group, dealers need not concern themselves. Happily, that group is steadily growing smaller and in the course of a few years unquestionably will be extinct. Automobile dealers and manufacturers have learned that papers whose editorial columns can be purchased by advertising contracts are not worth buying. The public soon

learn what these papers are doing and distrusts them, with the result that "publicity" which appears in their columns is a liability rather than an asset to the dealer whose name appears in it.

Perhaps this is a pretty severe stricture against some newspapers. Many papers have followed the line of least resistance in the motor car business. In the early days when it was the "automobile game" instead of the motor car industry, nearly every paper in the United States permitted a big latitude in the handling of automobile news and gossip which it would not permit in any other department. Some of the men in the early days of the motor car business were what newspaper men style "publicity hounds" and would rather have their own picture in the paper than an article of real value to their business. And the papers, eager to get all the automobile news there was, often fell for these "publicity hounds" whose later disappearance from the ranks of reputable dealers shows their lack of value to the industry.

There is no sharp line of cleavage between papers of the first group and those of the second. Every paper has its own method of handling automobile

news and on some of the papers of the second group these methods approach perilously close to the "free publicity" line. Of course, the stricter a newspaper is in the handling of its automobile news, the more valuable such news is to the dealer if he manages to figure in it. There is one paper in New York, for example, which has a hard and fast rule against the name of any automobile manufacturer or dealer appearing in its news columns. Rules, of course, are made only to be broken, and when a dealer's or manufacturer's name does appear in these columns it marks a real achievement in the publicity line.

Automobile Editors

In the larger cities newspapers have regularly appointed automobile editors whose sole duty is to "cover" the motor car field and get all the news about the industry. In smaller cities and towns, this work usually is done by some reporter who has numerous other duties and can give only a very small proportion of his time to the automobile business. In either case, you will find the automobile editor will be appreciative of any assistance you can give him and such assistance is sure to redound to your advantage.

Any newspaper man will tell you that getting people to know news when they see it is the hardest thing in the world. In my own experience as an automobile editor in Chicago, of the four-score automobile dealers in the city, I could count on the fingers of one hand the men who actually knew news. And I scarcely need to add that those few men got an extremely disproportionate amount of publicity for their business in my paper, the strictest newspaper in the city in the handling of automobile news. Now how to get that publicity. First of all, use a little diplomacy and courtesy. Don't be a grouch. If a newspaper man calls to see you, don't act as if he were a bill collector. It doesn't cost anything and it doesn't hurt you to be genial and courteous. Even when you are busy, you can spare the time for a genial "Good-morning" or "Hello,

there." It only takes a minute or so—no more time than to tell him you don't want to talk to him. And it pays a great deal better.

One of the busiest automobile dealers in Chicago always found time to talk to me when I was automobile editor for a newspaper. Sometimes he was so busy that all he had time to do was to tell me he was so busy he couldn't talk to me, but he never was too busy to tell me so in a courteous way. And as a consequence, I cherished that man's friendship and whenever it was possible for me to do him a favor I did so.

A "Horrible Example" of Publicity

To The Automobile Editor.,

For Immediate Release.

H.Y. SMITH CHIEF ENGINEER OF
ROBINSON MOTOR CAR CO. BEATS
JOHNSON RACING CAR WITH A
STOCK MODEL ROBINSON CAR.

Word has been received from Pres. H. B. Bartlett of the Robinson Motor Car Co. (Insert local dealers name here) Of

Another demonstration of the superiority of the Robinson motor car over all its competitors was given in a recent test made by chief engineer H. Y. Smith of the Robinson Motor Car company in Los Angeles three weeks ago. Mr. Smith, who is one of the foremost engineers in the industry and who has designed the present Robinson car, the "fastest thing on wheels" took one of the Robinson cars as it came from the assembly plant, without any more preparation to try it out on the streets of Los Angeles.

Mr. Smith came with the Robinson Motor Car company several years ago after having designed several cars some of the leading European manufacturers and has given to Robinson car owners the benefit of that experience. That he is well fitted for his high position with the Robinson Motor Car company is without dispute in the automobile industry and his achievements in designing the present Robinson car stamp him as one of the best designers in the world.

While spinning through the downtown district of Los Angeles, Mr. Smith encountered one of the Johnson racing cars which are to compete in the races on the coast this year. The driver of the Johnson car thought he would have some fun with Mr. Smith and teased him into a race. Mr. Smith stepped on the old Robinson and soon was going at the rate of 65 miles an hour, quickly dismaying the Johnson "racer".

This might be cited as a "horrible example" in dealers' publicity. To begin with, there is no news in it, there is nothing of local interest, no paper could print a story of this sort—boosting one car at the expense of another—without careful investigation of the claims, and the story exploits a breaking of the law.

In addition to this, it violates all preference of mechanical composition. The penciled corrections stand out glaringly and convey the impression of "sloppiness." The "Insert local dealer's name here" shows the dealer did not have sufficient interest in the story even to read it himself. Single spacing precludes editorial corrections.

Don't get the idea that you can "buy" a newspaper man with a few cigars, a few meals, a few drinks or by "handing him" something. In more than ten years in the newspaper business I can recall only one newspaper man of my acquaintance who was ever "bought." And he isn't in the newspaper business any more. In fact, I guess he never was in it. He was of it, but not in it.

"But what if I haven't got any news to give him?" you ask.

How do you know you haven't? I spoke before of only three or four out of eighty or more dealers in Chicago who knew news. But I found just as

many news stories among the other 75 or 80. The only difference was that the three or four knew news and the others didn't. The news was there but they didn't realize it.

The only way you can tell whether you have news in your business or not is to consult an expert. And the expert in this case is a newspaper man. By that I don't mean you must turn over your business to any inquisitive newspaper man who may take the notion to go prowling around in it. But you can talk to him a little while, let him in on a few of the things you are

doing. And don't be afraid that he is going to betray your business secrets. The average newspaper man prides himself on the fact that the courts have held that information given to newspaper men is just as sacredly confidential as information given to physicians, lawyers or the clergy. If you ask a newspaper man not to use something you may tell him in confidence, he won't do so.

Courtesy Pays

That is where your courtesy and geniality is going to pay. If you are courteous and good-natured you are going to find that the newspaper man is going to drop in to see you as frequently as possible. He will enjoy talking to you. And in the course of those talks you are going to say something that is going to appeal to his newspaper sense and you will be astonished to find your name in the news-

paper some morning when you least expect it.

And don't try to put over the shrinking violet stuff of saying that you don't want to see your name in the paper. Every human being likes to see his name in print, even if he does deny it. I don't know of any American who liked to see his name in print more than Theodore Roosevelt, unless, perhaps, it is Woodrow Wilson. And I'll make a little confession to you. When I was in the newspaper business I used to raise more "Cain" when the make-up man forgot to put "By Lambert G. Sullivan" over my stories than when he

"balled up" the story itself, as he only too frequently did.

So you see the question of getting publicity for yourself and your business is largely a human one; being courteous and genial with the men who can give you that publicity; using a little diplomacy and, above all, trying to cultivate a news sense. And after you have let a newspaper man jerk a couple of "stories" out of you that you didn't know were news, you will rapidly cultivate a news sense.

Now, as regards the sort of publicity you want. Of course, there are two kinds of publicity, the good kind and the bad kind. Pretty nearly any person can get his name on the front page of a newspaper if he wants to. All he has to do is commit a murder or rob a bank or do something of that sort. But that sort of publicity is not the kind you want. That is liability publicity, not asset publicity. Similarly, you can get publicity by giving poor service, but you don't want that kind. You want the publicity from giving good service.

Too Much "Bunk"

In the past there has been altogether too much "bunk" publicity, as we used to call it. The automobile factories used to, and still do, send around sheafs and sheafs of "publicity" each week. My daily mail used to bring in a score or more of these publicity letters and when I happened to be out of town for a few days and returned to my office the piles of these "publicity" stories on my desk used to make me fairly weep. And, confidentially, if I didn't feel particularly vigorous that morning, I used to shovel them, unopened, into the waste paper basket, assured that I wasn't throwing away anything of the slightest value.

But, on the other hand, I used to have a hard time keeping my automobile columns filled. I could have filled them a hundred times over by using this "publicity," but I never could bring myself to that. I used some of it, yes, but it was only stuff which was of real news value, stuff that was of some benefit to the readers of my paper. And about 90 per cent of the space at my

disposal each week was filled with stuff that I had to jerk out of people at first hand.

The great trouble with most of the factory publicity is that it seeks to glorify the factory end of the business. The factories send out mighty interesting stories about John Jones, president of the Yumyum Motor Car Co., but there are mighty few persons interested in what John Jones does. But they would be interested in what Henry Smith, dealer for the Yumyum motor car in their own city, was doing. You know that yourself. If you are handling the Hudson car, you don't care particularly what President F. C. Chandler of the Chandler Motor Car Co. is doing this

postage, but it's worth while. Perhaps one of the officials has given out an interview which is of some value to you coming from him but which might be of more value to you coming from you. Very well, just have your stenographer copy that story and substitute your name for his wherever it appears. Your factory probably won't object, you'll be the gainer yourself and the newspaper will be three times as likely to use it, coming from you, as from a distant factory.

Just a few words here about the phrase "have your stenographer copy that story." It will pay you to do that with all factory "publicity" you may submit to the newspapers. The work can be done when the stenographer has nothing else to do, and a story coming to the automobile editor written on your individual letterhead will convey a far better impression than one coming in a factory envelope. **Give Real News**

But what you want most of all is news concerning your own business, news peculiar to your own situation. Nearly every bit of publicity which comes from factories is purely sales publicity. And while, if printed, it may awaken sales interest, that will not help you if you have sold every car you can get your hands on and must get your shop busy to pay your expenses and make your profit until you can get a lot more cars.

That brings us right down to cold tacks. You want to get some publicity about your shop

and the repair work you are prepared to do, but you are up against the situation that getting that sort of publicity has never been attempted to any great extent. Newspapers are notoriously the most conservative organizations in the world. The shibboleth for every proposed innovation in a modern newspaper is "we never did it before"—an answer which seems all-sufficient to the man who makes it.

It is only by the process of education that this can be overcome. You may have some difficulty in convincing a newspaper man that his readers are just as much interested in knowing about new methods or repair or overhauling as they are

An Example of Good Publicity

A dollar spent now for motor car repairs and overhauling is ten dollars saved a few weeks hence, according to Tom Johnson, local distributor for the Robinson car. Johnson declares that too many owners neglect to take precautions with their cars for cold weather and that as a result the number of cars laid up for repairs in winter is unduly high.

Most dealers have plenty of room in their shops now for repair and overhaul work and as the workmen are at comparative leisure, they are able to do more careful jobs than a little later when the shops are full. Even the best cars need particular attention at this time of year when weather changes affect them severely.

This article is a good example of the manner in which a dealer might follow up a service propaganda campaign. The item is timely, is of local interest and the dealer's name is not unduly prominent.

Mechanically, double spaced it leaves plenty of room for editorial correction, is written plainly. One of its chief assets is its shortness.

Even a person little versed in handling publicity can readily distinguish its superiority over the example given on the page opposite. Mechanically and editorially it is superior in almost every respect.

On account of space and other limitations, it has been impossible to exemplify two of the worst faults of some publicity—it's wordiness and the flimsy paper it is only too often written on.

week, but you do care what Tom Hay, who is handling the Chandler car in your own city, is doing.

You can take advantage of that situation and help yourself and incidentally aid the newspaper man in your town by handling all the publicity that goes to the newspaper about the car you are selling by insisting upon sending it out from your own place of business. In that way you can see all the publicity which is sent out from the factory and resubmit to the newspaper of your own town only that part of it which is of real value to you.

Perhaps this method may cost you a couple of dollars each week for extra

about new methods in building. But if you can't convince him of that, you cannot be very much convinced of it yourself.

Here is the situation in the motor car industry at present, summed up just as briefly as possible. Production of cars is far behind the demand; nearly every car which will be made in the next few months has already been contracted for; prices are higher now than ever before and are likely to remain at that high level for a long time to come; as a consequence, motor cars now in the hands of private owners will have to be used much longer than has been customary in the past, both because they represent a bigger investment and because they cannot be replaced at will as heretofore.

With those facts—and that they are cold, gloomy facts I think everyone in the motor car industry will agree—you should be able to convince your newspaper man that it is up to him to give a little of his attention to the repair and maintenance end of the industry. Perhaps he won't see it right at first but if you let him chew on it a while and show him that you are giving him nothing but cold facts, he will realize that his readers, i. e., the owners of cars, are far more interested at present in how they can keep their cars going at a maximum of efficiency and a minimum of expense than they are in new cars. Of course, a great many of them want to know about new cars and when they will be able to get them but the vast majority have already been educated to know that getting a car nowadays isn't the simple proposition of going out and buying the one that strikes their fancy that it was five or six years ago.

How to Use Propaganda Dealerism

That matter of educating the newspaper man ought to be an extremely simple thing. They are already converted to the fact that good roads are a mighty important factor in the automobile business. You can take them a step farther and show them that good repairs, good maintenance, in short, good service, are equally vital. Most of your work has been done for you. Everyone in the United States is preaching conservation. Just take your newspaper man in hand and show him that motor car service is conservation in the motor car business to the nth degree.

There must be cooperation among the dealers to do this work effectively. Most of the first work must be along propaganda lines. The newspaper is more apt to fight shy of the individual dealer than he is of all the dealers combined. If a single dealer tries to "sell him" on the value of service publicity, he is likely to suspect that that dealer has an individual ax to grind. If the dealers' association, however, works along the same lines, he will be convinced that the policy is one of the entire industry, not of the individual.

To get down to a concrete example of how you can get the service idea across in publicity, I have only to refer to a feature of motor car dealerism which is gaining headway in many parts of the

United States. I refer to the organization of service managers' associations. The organization of a service managers' association in your town would not only be of a direct benefit to you in your service organization but should be of almost inestimable value to you in the publicity field.

I will let others tell you of the direct benefit of the service managers' association and confine myself to its benefits in a publicity way.

Let us suppose that you have already determined to organize a service organization. You have selected a meeting place and a date for the first meeting. Send the newspaper men in your town a notice of that meeting and an outline of what it proposes to accomplish. Keep them reminded a couple of times of the date of the meeting. And then the day of the meeting let one of the officers of your dealers' association call them up and tell them to be sure to attend the meeting as it is to be one of the most important of the year.

Cooperation Is Required

By that time you have at least aroused his curiosity and impressed upon him the importance with which you regard the meeting. He is almost certain to print a notice or two about the forthcoming meeting. And after he attends the meeting, he will publish a resume of what has been done at that meeting. So you have already put across two news stories regarding the service end of your business.

But don't let it stop there. Keep sending him stories, written on the letterhead of your dealers' association, in regard to what is done or is planned to be done by the service association. It would be well to delegate that task to one of the members of your association who, it seems to you, is getting more than his share of publicity. The reason he is getting that disproportionate share is that he is a better publicity getter than his fellows, and you need an expert on this job.

Gradually you will have worked your propaganda so that the newspaper man is convinced of the value of the service end of the dealers' business. He has realized that there is something to repair and service and, incidentally, he has been educating his readers to the knowledge that they can get up-to-the-minute service and repair news in his paper. His paper is benefited, his readers are benefited and your business is benefited.

Now, and not before, is the time for you to start shooting your own, individual publicity. Heretofore you should have an agreement with your fellow dealers that in the early publicity stories, no individual's name was to occur save in the names of the members of the new service association and the names of the firms they represent. This will have to be a matter in which you must trust your fellows to work for the good of the whole but you can practically obviate any danger of some "publicity hound" trying to steal the association's thunder by writing the various newspaper editors telling them the facts in the case and asking them to refrain from using the names of

any individuals. They will be glad to comply with your request.

Once the service and repair end of your business is established as a regular part of automobile news, you can start your individual work. By that time the newspaper and the newspaper readers have learned the value of good service and good repairs. Now you can show how you, individually, are striving to give better service than the man across the street. That is perfectly legitimate, for if you didn't think you were giving better value for money you receive than your competitor is, you wouldn't be doing business for long.

There are so many ways of getting that publicity that it is almost impossible to enumerate them. For instance, by the time your propaganda campaign is over, it will be quite as much news to your newspapers that you are building a new service station as that you are building a new salesroom—more important, perhaps. And it will be just as much news to know that you are adding to the equipment of your plant as it is to know that you have received a shipment of new cars; or that your shop has facilities to do work this week and will be crowded next week as that you have a car to sell this week and will not have one next week.

So much for getting your service idea across into the newspapers. It should be one of the simplest things in the world. But if you are going to make service your publicity campaign, you ought likewise to make it your advertising campaign. If you are talking service in the editorial columns of the paper and selling in the advertising columns, the readers of that paper won't know just exactly what you are trying to do. So let your advertising be along the service idea too.

Let the Factory Help

In this you deserve and should take steps to see that you get the cooperation of your factory. The automobile manufacturers throughout the United States have made their appropriations for the year, have signed their advertising contracts and will spend a certain amount of money in national and local advertising. They are spending huge sums in advertising now even though they have only a limited production of cars to sell and the problem throughout the country is not to sell cars but to make them in order to sell them.

As this is the case, why should not the dealer get a more direct benefit from the advertising his factory is doing? The factories declare that their advertising is for the benefit of their dealers. Unquestionably they mean what they say, but at the same time there can't be must benefit to the dealer from advertising which creates in the mind of the public a desire for something that the dealer has not got to sell and cannot get.

Why not spend some of this advertising money selling the dealers' and the factory's service? One or two forward looking companies are beginning to realize that this is fast becoming their duty, but unhappily there are only one or two of

(Continued on page 13)



Main aisle of automobile salon at Hotel Commodore, New York

Latest in Coach Work at New York Salon

First Post-War Exhibit Is an Exposition of Novelties in Body Building

NEW YORK, Nov. 20—The first post-war Motor Car Salon held in America, at the Hotel Commodore here, exhibited eighteen motor car builders and coach makers' masterpieces. Thirteen of these were motor car and the others were special body jobs. A show room attended in a manner most satisfactory to the exhibitors and a generous amount of purchasing marked the opening day of the display.

Among the cars shown were: Cunningham, Daniels, Delage, Dupont, Lancia, Locomobile, Meteor, Porter, Renault, Revere, Rolls-Royce, Singer and Sunbeam. Body builders exhibiting were Barker, London, Brewster, Brooks-Ostruk, Fleetwood and Rubay. In addition equipment was shown by Dunlop, Faure, S. Smith & Sons, The Laidlow Co., Westinghouse, Klaxon and Reese.

Five complete cars and a chassis of the new Porter were shown. The models included a collapsible landaulet, four and seven-passenger touring cars and an enclosed limousine. Brewster exhibited an enclosed drive limousine, landaulet, country brougham, runabout, and several

bodies on cars of other make. A Meteor, model R four-passenger touring, attracted much attention. Fleetwood bodies were shown on a seven-passenger touring and seven-passenger cabriolet of Packard make.

Two Rolls-Royce cabriolets were shown, one with a body of Brooks-Ostruk, and another with a body by Barket. A special Brooks-Ostruk body was also shown on a seven passenger Packard touring car. Singer exhibited a six passenger touring car and chassis. Delage entries were a four-passenger limousine, a sedan, town coupe, a cabriolet and a chassis. A semi-completed limousine body was accounted for by a strike of body builders in New York.

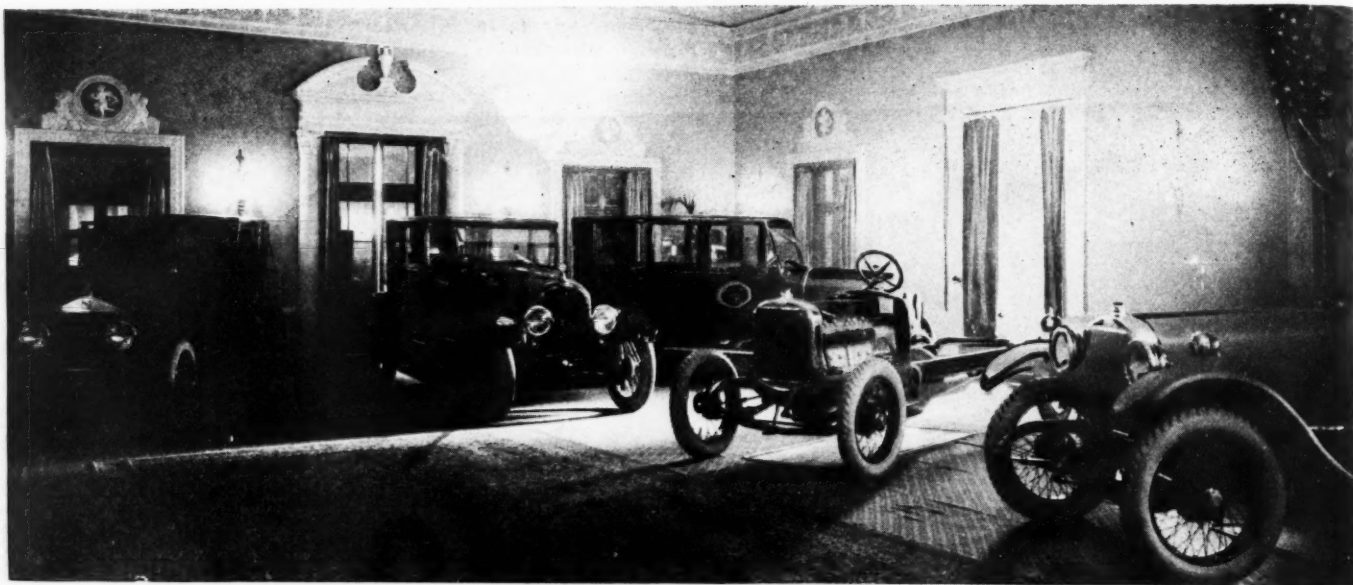
Daniels shows a landaulet brougham, four-passenger coupe, suburban coupe, six-passenger touring and a chassis. Rubay cabriolet bodies were shown on Marmion, Cole and Roamer chassis. Sunbeam showed two chassis, which arrived from England too late for building of bodies. The new Dupont was shown in a four-passenger touring and a chassis.

Renault exhibited four chassis and

three completed cars, a coupe-limousine with body by Binder, Paris; a limousine with body by Felber Fils, Paris, and a coupe-limousine with body by Kelner, Paris.

A feature of the Revere exhibit was a five-passenger touring car with Paris top, special pig skin lining, which had been sold to King Alfonso of Spain. Other models of this make shown were a roadster sport car, four and seven-passenger touring and a chassis.

The Dupont, a new entry, is a very clean looking chassis, with a 4-cylinder engine of the company's own design. The engine is of the "L" head, block type, with cylinder dimensions of 2 7/8 by 5 in. built by Weidely. A Stromberg carburetor is fitted, and a Sims magneto. Lubrication is by force feed to the main and crankpin bearings, and by spray to the cylinder walls and the minor bearings. The gear type oil pump is located on the cover of the distribution gear housing and is readily accessible. It is driven from the forward end of the camshaft. Hot air for the



A corner of the New York salon

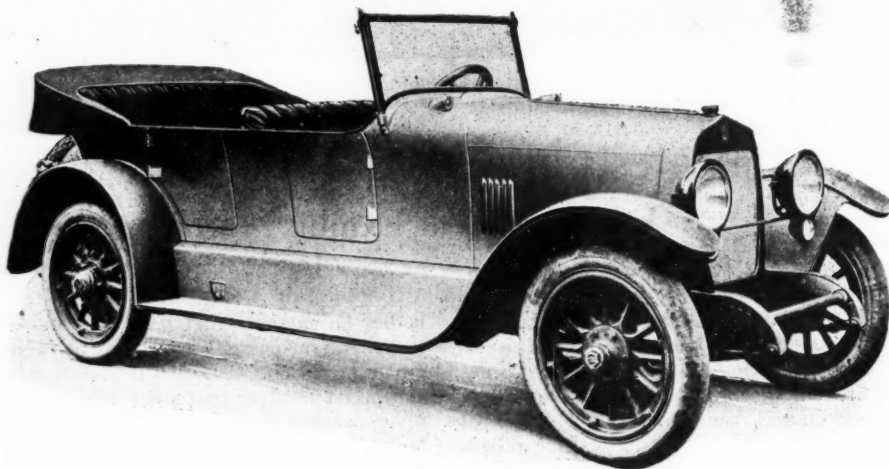
carbureter is drawn from behind the exhaust manifold, and is drawn through a passage cast in the cylinder block between the second and third cylinders. The inlet passages from the carbureter to the inlet valves extend between the first and second and between the third and fourth cylinders respectively. A thermometer is inserted in the water return manifold on top of the engine, and connects to an indicating instrument on the dash board, from which the instantaneous temperature of the water leaving the cylinder jackets can at all times be read off. The oil strainer is located in the bottom on the crankcase, can be readily removed through an opening in the side wall of the case. The Westinghouse electrical equipment, comprising a separate generator and starter, is fitted.

The power plant is of unit construction, comprising a single disk clutch and a four-speed and reverse change gear manufactured by Brown-Lipe. The third speed is the direct drive, and the fourth speed is an over-gear speed. The reduction between the engine crankshaft and rear axle on the direct drive is 43/11 to 1, while the reduction on the over-geared fourth is $3\frac{1}{2}$ to 1. Spicer universals and Columbia axles are used, and the car has a wheelbase of 124 in. Twenty gallons of gasoline is carried in a tank at the rear, and is fed to the carbureter by the vacuum system. The rear axle is of the floating type, and Hotchkiss drive is employed.

A feature of interest is found in connection with the rear springs, which at the end, instead of being shackled to the spring horns in the usual manner, have a universal joint connection with the spring horn, which relieves both the springs and the frame of any twisting strain. The car has left hand drive and central control, and there is a specially neat feature in connection with the throttle and spark control. Instead of a sector, there is a complete ring on top

of the steering wheel, and each of the two levers moves over one-half of this ring. The shafts of the levers at their lower end carry cams which act on single arm levers pivoted to the steering gear housing, and having their free ends connected by links to the parts to be operated. It is the intention to sell the com-

plete car with five-passenger touring body and full equipment at \$4000. chassis assembling establishments under one roof in Mt. Vernon. In the seven-passenger touring car the weight of the car, ready for the road, is equally distributed between the four wheels, which is claimed to favorably affect the steadiness of the car on the road, and the tire wear.



New du Pont car

plete car with five-passenger touring body and full equipment at \$4000.

One of the American exhibitors is the Singer Motor Co., Inc., which has recently been reorganized. Originally this company built 6-cylinder cars, but the model exhibited is a 12-cylinder with a $2\frac{7}{8} \times 5$ in. built by Weidely. The outstanding feature of this car is the very heavy frame, the side members having a depth of $8\frac{1}{2}$ in., and a width of flange of approximately $3\frac{1}{2}$ in. With this type of frame it is claimed to be impossible to get any body weave or door rattle.

This car is to be built in four, six and seven-passenger open jobs and four types of closed jobs. The company builds its own bodies, and has just completed plans for combining both its body and

A car designed to compete in the light, speedy class is the new du Pont, advance models of which were exhibited at the Salon.

Two chassis, one fitted with a touring body, were shown, and the makers, the du Pont Motor Manufacturing Corp., Wilmington, Del., announce that quantity production would be under way about May 1, 1920.

The car, which has a 124-in. wheelbase, will sell for about \$4,000. It is driven by a 4-cylinder, L-head engine of du Pont make. Like the price, the specifications of the du Pont have not been definitely settled, with the possibility that changes in construction may be worked out before the product is put on the market. However, it is the present intention of the

engineers to use magneto ignition, single steel disc clutch, two-unit starting system, full force feed lubrication and thermo syphon cooling.

The engine as constructed at present has cylinder dimensions of 3½ by 5½ in.

Wheels are of wood and tires 32 by 4½.

The manufacturers are one of the subsidiaries of the du Pont powder and allied interests.

DRASTIC ULTIMATUM WIPES OUT JITNEYS

Boston, Nov. 22—An ultimatum has been served upon a number of cities and towns in eastern Massachusetts notifying officials that they must take their choice now between electric street railway service or jitneys. The eastern Massachusetts Street Railway, which serves

all the territory outside Greater Boston, has delivered the mandate to the city and town fathers.

There has been no mincing of words. A definite date has been set to accept the ultimatum, that is by Dec. 1. The jitneys are not asked to be turned off on to side streets. The license of every one of these vehicles must be revoked, thereby putting out of business hundreds of such vehicles.

Cut Off Street Cars

Already the mandate was carried out in some places and the street car lines were discontinued so that the residents found that it was not merely a threat, but a reality. The Public Service Commission was asked to bar competition, but it found that it could not do so as it was up to the city and town authorities. When the request was turned down the railroad

officials then got busy and made their decision.

As the Eastern Massachusetts Street Railway is being operated by public trustees appointed by the legislature, thereby making them state authorities, practically, they have the power to do as they please, and the city and town authorities cannot override them.

Big Cities Affected

Three of the big cities have been ordered to discontinue jitneys, Brockton, Lynn and Lawrence, the two former big shoe cities and the latter a big mill city. There are other cities on the list, too. And the people who have been using the jitneys will have to take their choice, for the city officials are worried whether to cut out the jitneys. The jitney people are making a fight now, and they plan to organize. The motor truck dealers who

GETTING NEWSPAPER PUBLICITY

(Continued from page 10)

them which have taken this step forward. It is up to the dealer to educate his factory to this fact. He can do it easily. The great trouble seems to be that the dealer himself has not yet realized that advertising of this sort is more valuable to him at this particular time than mere sales advertising.

Some advertisers who are advertising even when they have no goods to sell declare they do it to maintain their prestige, to foster the demand for their goods until such a time as their production is up to normal or the demand is down to normal. They figure that while their advertising may not bring direct results at present, it means that they will make many sales in the future from this source.

There is more than a grain of truth in that. It is an axiom of advertising that advertising, to be of benefit must be continuous, not spasmodic. And if an advertiser is to derive the greatest benefits from his expenditures, he must keep his product before the public when he has nothing to sell just as much as when he has plenty to sell.

Granted the truth of all these assertions, doesn't it seem to you that a manufacturer can keep his product before his public quite as well by advertising his service as he can by advertising his product itself? Won't he gain just as much prestige by it? Won't solicitude on the part of the manufacturer for his customers in this direction mean satisfied customers and reorders? And wouldn't you or I, if we didn't own a car just at present but intended to buy one next year or the year after, keep in mind the manufacturer who thought enough of the owners of cars he had already sold to spend some of his money advising them how they can get the most enjoyment and the most service out of those cars? It has always seemed to me that he would gain more prestige with me than the manufacturer who spent his money on nothing but advertising the transcendent virtues of his cars even when he knew you couldn't buy one of those cars for love or money.

ANTI-FREEZE

Columbus, Ohio, Nov. 22—Coroner Heintz, investigating the death of Walter F. Roberts, 39, Dayton, at St. Francis Hospital, Monday night, found it was caused by drinking denatured alcohol.

Elmer Lindsay, 64, of Dayton Soldiers' Home, who is recovering from the effects of drinking the same thing, told Coroner Heintz that the stuff was used in automobile radiators to keep them from freezing. Roberts secured it at a garage where he worked in Dayton.

That's where you've got to take up the cudgels with your factory, with your distributor or your branch house. Automobile factories have got so accustomed to advertising new cars that advertising such a thing as service or maintenance probably would be rank heresy to them. Can you imagine any motor car manufacturer coming out in print and advertising that the carburetor on his 1914 product isn't the best thing in the world to use with the present grade of fuel? Yet isn't that what you have to tell your customers when they come in to complain?

Why shouldn't the dealers organize a propaganda to obtain advertising from manufacturers which really is helpful to them? It doesn't salve the dealer any for his factory to tell him that it is spending three or four million dollars this year in advertising when that factory can't give the dealer enough cars to sell to keep him going. Why not spend a little bit of it helping the dealer since all this national advertising is supposed to be for the benefit of the dealer?

Now as to the mechanical way of handling publicity. There is more in mechanical handling of newspaper copy than a great many persons seem to realize. A lot of automobile publicity which otherwise might be used now goes to the waste basket because it comes in a form which cannot be readily handled. You

hear a great deal about how much money is wasted annually in printers' ink, but it doesn't compare with the amount that is wasted annually in typewriter ribbons.

There are just a few things to remember in this mechanical handling of newspaper publicity. The paper, for one thing, should be fairly strong and smooth. Newspaper men work with extremely soft pencils and a rough paper will wear a pencil of this sort down quickly. A thin, "flimsy" paper is awkward to handle, tears too quickly and is difficult to read. The best paper for newspaper material is the typewriter's ordinary yellow "second" sheet.

Then always write all stories double or triple spaced. There is a saying in the newspaper profession that if the Bible were given in manuscript form to the modern copyreader he would find some corrections to make in it. "Flat copy"—that is, copy on which no corrections are necessary—is the unattainable thing in the newspaper field. And for corrections and interlineation, the copy should be widely spaced to give plenty of room.

Then there is the question of how long to make your publicity stories. The answer is just this: make them just as short as you can. There is a shortage of print paper at present which makes the shortage of motor cars look like an overproduction. Newspapers all over the United States are throwing out paid advertising because they can't get paper enough to print it on. And the editorial pages are being pared to the quick just as much as are the advertising.

Scores of persons fall into the error of thinking the more they send a newspaper, the more chance they have of having some of it used. The opposite is the truth. The less you send, the better your chances are of landing. A 50 word story has a thousand times more chance of getting into print than one of 500 words. And those short ones are the ones which stick in the reader's memory. Remember just this. Every one of us remembers Lincoln's Gettysburg Address but none of us even remembers the first paragraph of Burke's speech on Conciliation with the American Colonies. And we had to wade through both of them when we went to school.

have been selling the new type of omnibus in some of these cities are also up in arms over the warfare, and they are going to try to do something.

In Boston, for the past three or four months the owners of omnibuses who have been trying to get licenses to operate have been blocked by the city council, which requires \$25,000 bonds and will not accept anything except cash or its equivalent, thereby tying up six or seven companies with some 30 busses, while the people are paying a 10 cent fare.

In the cities where the Eastern Massachusetts Street Railway operates the fares are 10 cents and the jitneys have been running for five cents, which makes it all the worse. But the public trustees say they cannot make the roads pay with jitney competition and so jitneys or street railways must go as both cannot survive.

JITNEYS COME BACK IN CONNECTICUT

Hartford, Conn., Nov. 21—Jitneys are coming back stronger than ever in this state, due to the raise in trolley fares by the Connecticut Co. A so-called zone system has been installed and in many cases tariff has been doubled. There is hardly a truck dealer in town but what has featured jitney bodies and considerable material that had been set aside is coming in useful.

Motor Firms Have Coal Factories in Chicago Vicinity Have Fortnight's Supply

Some Plan to Get Power From Outside Sources

CHICAGO, Nov. 24—Production of motor cars and automotive parts in this vicinity has not yet been seriously affected by the coal strike. Nearly all of the principal factories have a sufficient supply of fuel to continue in operation for the next two weeks. Those that are on the verge of closing down have taken steps to insure power and heat so that they may continue.

The Nash Motors Co. at Kenosha is well supplied and the coal shortage must continue for several weeks before any scarcity will begin to affect production. This is likewise true of the J. I. Case T. M. Co. at Racine as they have a 60 days supply on hand which is sure of tiding them over the period of shortage.

Local Companies Well Supplied

Some of the local companies like Buda and Elgin seem to be well supplied, either having it on hand or a sufficient supply in transit. Elgin gets its power as electric

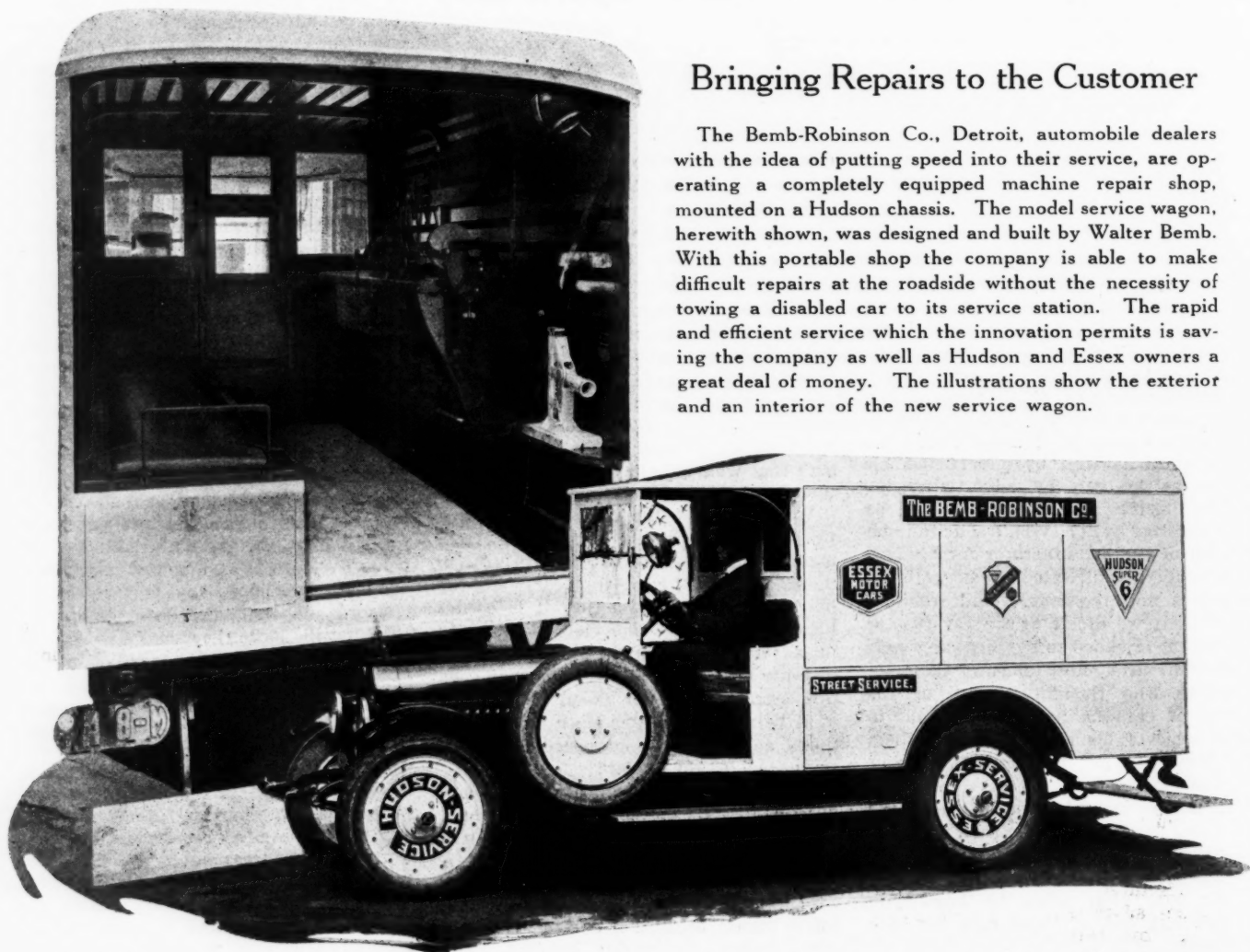
current from the public service corporation there but furnishes its own heat, for which purpose it has ample coal. The Buda Co. will not be affected for at least two weeks and they also have a supply in transit. The Stromberg Motor Devices Co. has completed arrangements whereby it can burn crude oil in case their coal supply fails.

The Beloit plant of Stewart-Warner is the most seriously affected as it was expected that it would be shut down today providing no new shipments were received. The Chicago plant is well supplied and can continue without interruption for several weeks.

Providing the temperature remains moderate as at present and there is no sudden cold wave to increase the amount of coal burned, the general conditions seem to be that no factory will be forced to limit its production for at least two weeks. The present indications are that coal will be coming through again by that time and that production will in no way have been retarded by the effects of the strike.

SET DATES FOR ST. LOUIS SHOW

St. Louis, Nov. 24—The week of Feb. 15 has been decided upon as the date for its motor car show by the St. Louis Automobile Manufacturers and Dealers' associa-



Bringing Repairs to the Customer

The Bemb-Robinson Co., Detroit, automobile dealers with the idea of putting speed into their service, are operating a completely equipped machine repair shop, mounted on a Hudson chassis. The model service wagon, herewith shown, was designed and built by Walter Bemb. With this portable shop the company is able to make difficult repairs at the roadside without the necessity of towing a disabled car to its service station. The rapid and efficient service which the innovation permits is saving the company as well as Hudson and Essex owners a great deal of money. The illustrations show the exterior and an interior of the new service wagon.

tion. The show will be held in the building now being erected for the Weber Implement & Automobile Co., if it is completed in time; otherwise in the old Southern Hotel building. If the Weber building is used, a part of the space will be devoted to the display of trucks, which is not possible in the other suggested location. Six new members have been elected to the association.

The convention of dealers of the Traffic Motor Truck Corp. will be held at Hotel Jefferson, St. Louis, Dec. 11 and 12. According to H. H. Hawke, general sales manager, 400 dealers already have announced they will attend.

OLD SPANISH TRAIL PROGRESSES

New Orleans, La., Nov. 24—Delegates attending the annual convention of the Old Spanish Trail Association in San Antonio, Nov. 14-15 report more than 60 per cent of the work necessary to complete a hard-surfaced highway, from Jacksonville, Fla., to San Diego, Cal., has been finished.

Battery Men in Meeting Prest-O-Lite and Vesta Dealers are Urged to Conserve

Conventions Mark an Important Step in the Industry

BOSTON, Nov. 22—Two large conventions of battery dealers in New England have just been finished here. The Prest-O-Lite forces were the first to call in their New England distributors, having something like 75 from all over the territory present at a two day's conference. From the factory at Indianapolis came F. A. Wilson-Lawrenson, vice-president; B. W. Clark, sales manager; W. H. Wilson, E. G. Munroe and H. W. Jones, heads of engineering departments; Marques Regan from New York, and J. Huver, of Detroit. Mr. Wilson-Lawrenson stated that the production would be jumped from 750,000 batteries this year to 2,000,000 next year, but even then the demand would exceed the supply. So he advised all to work out service plans for conservation.

B. W. Clark sounded a new note in suggesting that all dealers get on intimate terms with their legislative representatives for in the next few years there would be a lot of laws aimed at the motor industry, so it was time to organize to combat it. Addresses were also made by the other men and with illustrated lectures on batteries, etc., all the dealers got some good information. The convention ended with a big banquet.

The other convention called by the Vesta Accumulator Company of Chicago brought together distributors of that product from all six New England states numbering more than 75. Ward S. Perry, secretary and general manager, and F. S. Armstrong, sales manager, came on from Chicago to make addresses. Mr. Perry gave some interesting facts about the battery situation, stating that the business will increase more than 100 per cent in 1920 but that it would be inadequate for all needs. Mr. Armstrong urged all the dealers to get every ounce of service out of every battery, no matter how old, and to repair batteries of every make, which could easily be done.

Romany Rye Must Use a Flivver

At last it has come! Cincinnati it such a patriarch among cities that it thinks there are no new spectacles under the sun, but the old town received an eye-opener one day last week when a caravan of Gypsies made its appearance in the northern suburbs of the city—in motor trucks and touring cars! Gone were the rickety and dingy vans of other days, drawn by brown-and-white spotted horses of the spare-rib variety, a kind of transportation that has been used by the Gypsy tribe for a thousand years and more in its wanderings over the face of the earth. What matter that the two trucks, one a large covered one for the biggest family of the caravan, and four passenger cars all were of the genus "flivver"? A man from the Firestone Ship-by-Truck Bureau at Cincinnati, commandeered an automobile, chartered a photographer and hot-footed it to the bottoms of the Millcreek valley, where the Gypsy camp is pitched, and obtained the accompanying photographs.





EDITORIAL



Regarding Anti-Freeze Mixtures

IF you chance to be a dealer living in that part of the country where the word "winter" is linked with snowstorms and icy streets, probably you are going to sell your customers some sort of anti-freeze preparations for their radiators. But make sure that you get the job of putting in the compound, whatever it happens to be. If you have sold a certain anti-freeze preparation in past years, you know better than your customers how it ought to be used and should, therefore, be alert to opportunity and cash in on your experience.

TOO few car owners take the time to read the makers' directions on the packages of anti-freeze compounds, with the result that their cooling systems freeze and they are out the price of a new radiator, or the cost of having the block removed and the waterjacket welded. The next

thing such owners do is condemn the mixture they thought would safeguard them over the cold weather period. Had they followed the maker's direction, nine times out of ten, they would not have gone wrong. There are too many instances to prove that anti-freeze preparations put out by reliable concerns will do what the makers claim.

IT is clearly up to the dealer to step between the car owner and Boreas' icy blasts and see that if he is going to drive his car all winter to be sure to protect properly the cooling system. Merely selling the stuff is not enough. If you are sold on the stuff yourself, do not just sell it over the counter. Go a step further and put it in your customers' cars—and charge them for the job. This is not free service. Your customer will think highly of your place and come back for other things.

The Why of Labor-Saving Machinery

IN spite of all that has been written and said about installing labor-saving devices in the shop, there is still considerable holding off on this point by owners of service stations or repair shops in many of the smaller communities. We do not expect the small-town dealer to stock up with a list of machine equipment such as the dealer handling the same car in a large city would be likely to have, but he ought to put in equipment which will help him do his work more quickly and better.

MECHANICS cannot do a good job on a rear axle, for example, when the parts are strewn all over the floor, together with tools, cans of lubricants, etc. Even if the proprietor of such a shop does not wish to buy an axle stand, such as the market affords, the least he can do is have a stand made or make one in his own shop out of materials which are obtainable on the premises. Home-made devices, while not as good, usually, as the manufactured articles, are, nevertheless, helpful and a step in the right direction. They usually mean that next time a better one will be purchased.

IMAGINE a department store nowadays, trying to get along without show cases, its wares spread out all over the floor, no overhead baskets to carry the merchandise to the wrapping department, no racks on which to display its wall paper and a host of other similar situa-

tions. How long before such a business would cease to be money-making and become a liability?

YET a great many service stations and shops are being run on that basis and the owners are probably wondering why business does not pick up when the shop always is busy. The reason is simply that the work is being done along the lines of greatest resistance. To be specific, suppose the shop has no portable crane. Jones, who has just loosened the rear axle on a car wishes to have it on the bench. He calls to two or three other men to give him the necessary lift. They leave their jobs and after the axle is on the bench, the men argue the best way of taking down the job, whether the axle is any good or not, etc. All this means wasted time, and another waste occurs when Jones has the axle ready to put back into the car. With a crane, Jones can lift the axle on the bench alone and with little effort. This is but one instance.

SOME shop owners will tell you they cannot afford equipment. To such, we say they can't afford not to have it, because, while the first cost may appear large, it will be absorbed in a short time, because, better work can be turned out more quickly. This means customers will be better satisfied and there will be a bigger influx of work. Motor car owners seek the shop where they can get a job done quickly.

Coming, Dec. 4—The Motor Age Master Sheet.

Do you consider your service important?

If you do, the Master Sheet will help. It places estimates and repair operations on a business basis. To have the invoice ready promptly is part of it's function. It helps sell service. It makes a business of service.

It makes each operation in the shop a clean operation. There is no overlapping. It simplifies getting a reliable cost figure. It's use will make service profitable.

Asks Aid For Railways

Director General Hines Forecasts
Serious Shortage of Cars

Trucks Can Be Called on to Assist
in Transportation

DIRECTOR General Hines of the United States Railroad Administration in a statement made public recently predicts a serious shortage of freight car transportation facilities. The statement is addressed to shippers and receivers and urges them to help relieve the impending congestion.

Trucks to Help Railroad

Commenting on the announcement, R. E. Fulton, Vice-President of the International Motor Co., said:

"Director Hines' appeal prompts the question, 'In what way can the motor truck best serve to assist the Railroad

Administration?' To answer this is but to emphasize the necessity of co-operation with the railways rather than competition. Let the motor trucks take over completely the traffic they have already proved itself to be more efficient to handle. Let them be, in effect, branch lines and feeders of the railroads to unload the freight at the outlying railroad yards and deliver it to the consignee's door, incidentally at a lower cost and more quickly. This would release valuable car space that is ordinarily tied up in switching cars around within a city, and eliminate the necessity of leaving cars on sidings or spur tracks until they can be picked up by a locomotive.

"The development of motor express routes to handle tonnage over shorter distances should be encouraged because they relieve freight cars for long distance transportation. Shippers as well as the motor express companies should do all in their power to provide capacity loads and eliminate every bit of waste space they possibly can.

Cheaper Than Roads

"This appeal by the Railroad Administration has a vast significance to the

motor truck industry. It is proof that the railroads do need the co-operation of all the participants in the nation's transportation scheme, and that the motor truck will be called upon more and more each day to take over the traffic that the railroads cannot accommodate. To the dealer it offers unlimited encouragement and should be an incentive to intensify selling efforts. To the general public it will mean better transportation service at a lower cost.

"As as cost is concerned, the motor truck has already shown that it is more economical than the railways for this sort of transportation. Yet a great many people have still to be educated to these advantages, and it requires forces of circumstances such as this to provide that education. When there is anything that has always been done in a certain way, the general consensus of opinion is that it cannot be done any other way until the pinch of necessity gives another method an opportunity to demonstrate its value."

Ruggles Gets Truck Firm

President of Republic Co. Gets
Majority Stock in Concern

John N. Willys Also Is Interested in
Michigan Deal

ALMA, Mich., Nov. 27—F. W. Ruggles, president of the Republic Motor Truck Co., Inc., located here, formally announces that he has, in connection with John N. Willys and W. J. Baxter of New York City, acquired control of the Republic Motor Truck Co., Inc., and the Torbensen Axle Co. of Cleveland, Ohio. The interests formerly held in these corporations by parties located in Cleveland, Alma and other points, were purchased outright. The men whose holdings were purchased, including Charles G. Rhodes, former secretary of the Republic company; C. F. Hepburn, former vice-president and general manager; J. O. Eaton, and others,

have no further connection with either of the organizations.

In spite of conflicting rumors which have been published recently, the Willys - Overland Co. of Toledo, Ohio, is in no way connected with the transaction, which was a purely personal investment by himself, John N. Willys and W. J. Baxter.

Mr. Ruggles also announced that the original administrative policies of the Republic Motor Co. will in large measure be continued, and predicted a period of continued growth and prosperity for

for the big truck manufacturing company.

HASTINGS SUCCEEDS DRAKE

Detroit, Nov. 20—Election of Charles D. Hastings, vice-president of the Hupp Motor Car Corp., to the presidency to succeed J. Walter Drake, comes as deserved recognition of the personality so closely woven with the success of the corporation. The elevation of Hastings came at the November meeting of the directors and was at the personal request of Drake, founder of the company and the man with whom Hastings has worked hand in hand for ten years.

Bogus Solicitor at Work

Periodical Publishers' Service Co.

74 BROADWAY, NEW YORK

I Have Paid Your Representative \$ 300 One Year's Subscription

Mag Motor Age

By H. H. Goode

Name C. H. Jacobson

Address 2377 Monroe Ave.

P. O. Ogden State Utah

Representing himself as a subscription solicitor for automobile trade publications in the Class Journal Co. group, a man giving the name of H. H. Goode, has been collecting money without authority in Southwestern and Western cities. He was last reported on the Pacific Coast, where the police are on the lookout for him.

The man is not authorized to collect money for subscriptions to MOTOR AGE, Automotive Industries, Motor World, the Commercial Vehicle, Motor Boat or the Tire Rate Book. There is no such corporation as the "Periodical Publishers' Service Co., 74 Broadway, New York," which he claims to represent.

Goode has been representing himself as an ex-service man. One of his so-called "receipts" for subscription to a Class Journal publication is shown in the accompanying cut.

TO BUILD NEW ELECTRIC

Jamestown, N. Y., Nov. 21—The Chautauqua Electric Car Co., Inc., is purchasing the plants of the Supreme Furniture Co. and the Lynndon Mirror Co. at Falconer and is planning to erect a building to connect these two plants and begin manufacturing operations early in the new year. The two buildings are located on adjoining lots and are to be joined by a new building.

It is expected that 250 men will be employed at first and that the output will be about 600 electric automobiles the first year.

Syracuse and Rochester to Meet in First Air Derby

ROCHESTER, Nov. 24—Aerial Fans, listen! Syracuse has challenged Rochester to an aerial derby between the two cities which has been accepted by the Rochester Aero Club, Inc.

There is not much definite upon the proposition yet, but it's real in prospect. The idea belongs to Harry Smith, secretary of the Syracuse Aero club, who addresses a letter to the Rochester organization challenging it to such a derby.

The general idea favored by those who have talked the proposition over is to make the derby have both sporting and commercial interest. For instance, the plane flying for Rochester would leave here with 200 pounds of merchandise for

Syracuse, stop and unload this at Syracuse and bring back a passenger for a record trip to this city.

KENWORTHY TO BUILD NEW CAR

Chicago, Nov. 24—C. Y. Kenworthy, formerly vice-president of the Barley Motor Car Company, builder of the Roamer car, and Chicago dealer for the Roamer, has resigned his position with that company, to manufacture the Kenworthy car at Mishawaka, Ind. The company is incorporated for \$400,000, with Mr. Kenworthy as president.

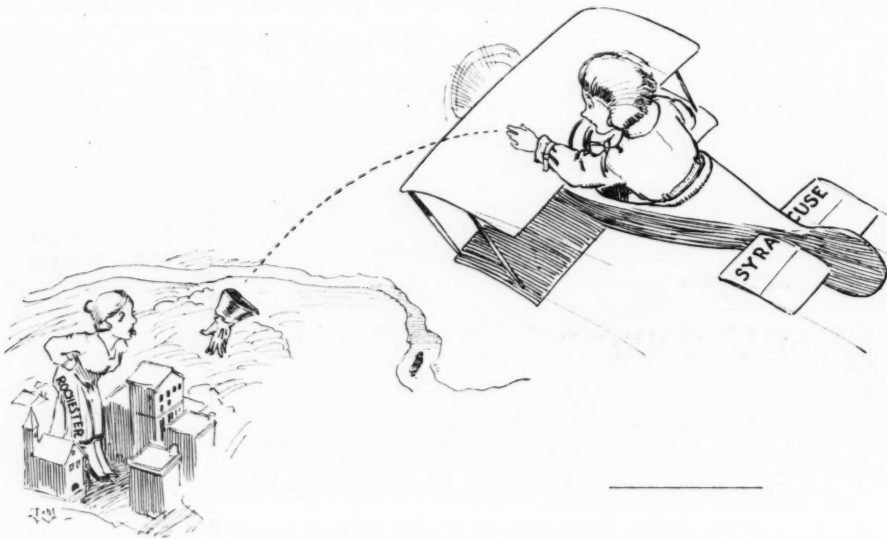
The car is to sell for \$3,500. It is to be a quality car, according to Kurt Hitke, production manager of the company and known in racing circles as a pilot on the

Roamer team. Wheelbase is to be 130 in. and powered with a Continental 9-N engine. A Brown-Lipe transmission is to be used. The factory has been purchased and is now being remodeled to suit motor car production needs. It is expected that six cars will be ready for the show season.

TRACTOR COMPANY HELPS FARMER CUT LIVING COST

New Orleans, La., Nov. 26—The Farm and Industrial Implement Co. of New Orleans has hit upon a new way to help the farmers of this section of Louisiana reduce their costs of production on their crops. The company provides tractors, plows, harrows, discs and drills, with fuel and lubricating oils and trained men to operate all the machinery to the farmer for reasonable rental, and does all the cultivating, planting and, in the case of cereals, potatoes, cane, etc., the harvesting of the crop for him and under his supervision. Cotton is planted and cultivated, but not harvested. The cost of this service to the farmer is approximately 4 per cent on the money he would have to invest in the tractor and implements used in the work, so that he is saved from tying up capital on which he can earn, if he has it, 7 to 8 per cent, while, if he has not the ready money to buy these implements, he is saved a part of the interest he would have to pay a bank for the loan of the money.

The company now has ten outfits at work constantly on farms near New Orleans and, according to B. A. Rupprecht, general manager of the company, is preparing to install as many more. The charge depends, of course, on the nature of the soil, the crop to be planted, methods of seeding, and of harvesting. Mr. Rupprecht has had long experience



ISSUE NEW AIRCRAFT BOOK

New York, Nov. 20—The process of the evolution of the aeroplanes from pre-war models, through the war, and the evolution that is now in progress to meet the demands for commercial and other peacetime activities are shown in the Aircraft Yearbook for 1920, which is being compiled by the American Aircraft Manufacturers association.

It is expected that the yearbooks will be off the presses about the first of the year, and hundred of demands for them from manufacturers, technical societies, libraries, foreign exporters, trade engineers, and foreign and American transportation companies have been received.

JEFFERSON HIGHWAY MEETING DEC. 18.

Alexandria, La., Nov. 24—Louisiana chapter of the Jefferson Highway Association, which is charged with the duty of arousing and maintaining interest in this road throughout Louisiana, will hold its annual convention here December 18. At this meeting New Orleans will elect two civic directors who will become members of the national board of directors.

Iowa Truck Dealers Find Truck Parade Will Pay

IOWA DEALERS HOLD TRUCK TOUR

DES MOINES, Iowa, Nov. 24—The Des Moines Motor Truck Dealers association put on its second truck trade tour last week, making a three-day run into southern Iowa. Chariton, Osceola and Creston were the principal towns visited in the short tour as the October truck trade tour had to curtail the program at Chariton and Osceola and eliminate Creston on account of the rain storm which struck the first tour. Twelve trucks made the short tour and the program for this tour was different from its predecessor in that time was allowed to show the farmers of southern Iowa just what the trucks would do. The trucks made trips out from all three towns into the country and into the field to bring to town produce and livestock which the farmers had for delivery. All kinds of farm produce were hauled to the markets in time which fairly opened the eyes of the farmers.

There is no question but that the two truck trade tours have gone a good ways

with trucks and tractors, having been to sell the farm truck idea to the agriculturists of this section. They have also tended to create more interest in truck lines out for a radius of fifty miles from Des Moines. Des Moines jobbers and wholesalers are authorities for the statement that more goods are being shipped to towns within a few hours run by trucks than are being carried to these same towns by railroads.

AIR SHOW SPACE IN CHICAGO SOLD

Chicago, Nov. 27—Arrangements are fast being completed for the Aeronautical Show of Chicago, the first national aeronautical show of 1920, which will open at the Coliseum Jan. 8.

The demand for space has been so great that the management has decided to set aside the Annex for the accessory exhibits. The Curtiss Aeroplane & Motor Corp. occupies the largest space, 86,000 sq. ft. is its allotment, and it will be able

to show all 1920 models. Among its exhibit will be the new Curtiss "Eagle," a multi-passenger touring limousine, and the altitude record holding "Wasp" triplane. The Goodyear Tire & Rubber Co. will occupy 4,000 sq. ft. of space and will feature their exhibit with a new type of dirigible. The Dayton-Wright Co. will have two of their latest planes on exhibition, and the Aeromarine Plane & Motor Corp. will center its attention on hydroplanes. The Packard Motor Car Co. will show its newest Liberty motors, and the Wright Aeronautical Corp. the famous Hispano-Suiza motors.

ITALY TO HOLD RACES

Paris, Nov. 6—Italy proposes to hold a road race next fall for machines having a maximum cylinder capacity of 183 cu. in. It is believed that the course will be over a set of fast roads in the neighborhood of Brescia.

Immediately after the automobile race Italy will stage an important aviation meeting, which will include the race for the Schneider Cup, to be competed for by flying boats. The aviation meeting will be on a more scientific basis than any held in the past. There will be a test for the highest and the lowest speed, awards being given according to the greatest difference between the two speeds. There will be a 600-mile competition with a minimum useful load to be carried. Another competition, over a distance of 700 miles will be for planes with two or three engines. Points will be given for speed, climbing ability, load carrying, and ability to fly with one or more engines cut out.

Italy was the first European country to hold a post war motor car race.

Ten Drivers Invited to Race at Tacoma in 1920

PLANS FOR 1920 TACOMA RACES

TACOMA, Nov. 26.—Ten of the nation's most famous racing drivers will be invited to participate in the 1920 track events at the Tacoma Speedway on July 4, 1920. W. C. Baldwin, president of the speedway, says that he already has assurances that Ralph Mulford, Louis Chevrolet and Cliff Durant will take part in the speed contests. The ten drivers will be picked men and two foreign built cars with foreign drivers will be a feature of the event.

The Tacoma Speedway association will offer \$25,000 in prizes for the 1920 contest. This exceeds the 1919 purse by \$10,000, making the largest purse ever offered on the Pacific coast for either a road or track event. Pres. Baldwin will announce the names of all entries for next year's events at an early date. One of the features at the speedway in 1920 will be the introduction by Cliff Durant of four new racing cars now building at

Murphy and Lewis Break Record in New Duesenberg

NEW YORK, Nov. 21—Driving Duesenberg cars in non-competitive speed trials under A. A. A. observation at Sheepshead Bay today, Dave Lewis and James Murphy set new marks for 100 mi. and 300 mi. respectively, which have been referred to the Contest Board and may be declared records.

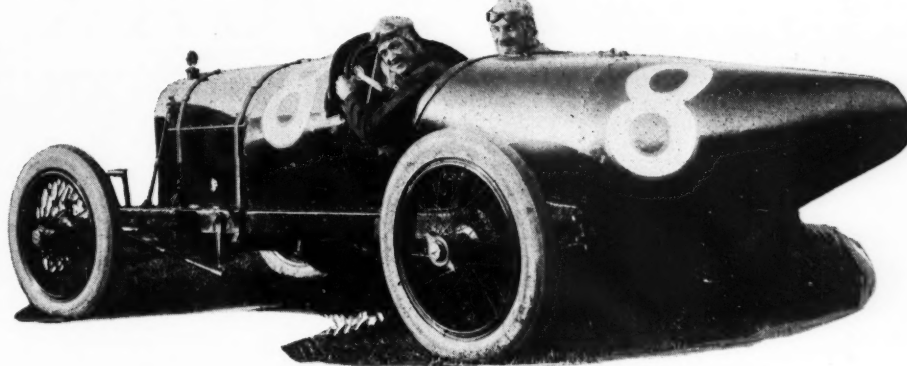
Lewis covered the 100 mi. course in 53 min., 25.4 sec., averaging 112.3 miles an hour. This was done in an overbored 300 in. car which is placed in the 301-450 cu. in. piston displacement class.

Murphy drove a new 183 in. Duesenberg, showing 98 miles for the first hour, in which no stops were made. During the second hour the car ran out of gas on the backstretch and Murphy lost more than eight minutes, including a stop of nearly five minutes. He traveled almost 92 miles in the

DUESENBERG HOUR RECORDS

Dave Lewis		
303 cu. in. displacement		
Miles		Time
10	.....	5:14.00
20	.....	10:31.40
50	.....	26:30.60
100	.....	53:25.40
1 Hr. 111 mi.		

J. A. Murphy		
183 cu. in. displacement		
Miles		Time
10	.....	6:14.60
20	.....	12:26.40
50	.....	30:57.40
100	.....	1:01:24.20
150	.....	1:32:12.60
200	.....	2:12:08.80
250	.....	2:42:59.40
300	.....	3:15:44.00
1 hr.	.....	98 mi.
2 hr.	.....	182 mi.
3 hr.	.....	276 mi.



Dave Lewis in new Duesenberg racer

second hour, and slightly over 90 miles in the third hour.

HEARNE CLAIMS NEW RECORD

New York, Nov. 21—"Eddie" Hearne is claiming a world's record for his 100-mile performance on the dirt track in Phoenix, Ariz., Nov. 8, when he drove a Chevrolet car the distance in 1 hr., 29 min., 09 sec. The previous record is 1 hr., 31 min., 30 sec.

As soon as the surveyor's certificate, authentically setting the exact length of the Phoenix course, is received the performance will be acted upon by the contest board of the A. A. A.

Foscoe Sarles finished second to Hearne in a Frontenac, with Cliff Durant (Chevrolet), third and Toland Nicholson (Hudson), fourth.

EDENS HEADS PARKS HIGHWAY

Spokane, Wash., Nov. 22—William G. Edens, of Chicago, was re-elected president of the National Parks Highway association at the annual meeting in Spokane on Nov. 15. Donnell G. Fisher, of Seattle, will again officiate as first vice-president and Frank W. Guilbert of Spokane was re-elected executive secretary.

the Oakland plant of the Chevrolet. Mr. Durant will enter one and possibly two of these cars at the races next year in Tacoma.

In the last few years the Tacoma Speedway has become the center of motor car racing in the Northwest and Pacific Northwest. The last three years the drivers have been limited to five men who have been picked from over the nation. In 1920 the speedway will double the number of drivers.

Heretofore the events at the Tacoma Speedway have been three in number and the longest race was 75 miles. In 1920 the longest race will be 200 miles. Another event will be 25 miles. It is also planned to hold the qualifying test as a feature to entertain and thrill the early crowds at the track. All details of the program for 1920 as proposed by the speedway officials has been taken up with the American Automobile Association for consideration.

Bright Outlook in East

Rochester Dealers See Prospect of Good Business for 1920

Booking Orders for Spring Delivery is Begun and Railroads Asked for Aid

ROCHESTER, Nov. 21—Trade conditions in Rochester this fall point to a brighter outlook for automobile and accessory dealers for the spring of 1920. Conditions have been unusually hard this past year, especially with the dealers in new machines. An unusual amount of business was transacted by dealers during the first part of the year but the impossibility of obtaining machines from the factories led many persons to buy used cars, rather than wait for delivery.

A concern here, selling on an average of 20 cars a week for a medium-priced machine, has been unable to get through more than 30 vehicles a month to take care of the demand. Coupled with the fact that the automobile firms have been unable to fill orders, due to war conditions, the railroad companies have been slow in getting deliveries to the various firms.

Taking Orders for Spring Delivery

With the hope of getting cars through from the factories in the spring dealers are taking numerous orders for delivery early in the spring. One firm, selling a car priced at \$1,500, has more than 100 orders filed with the factory. Another, selling a lower priced machine, has 239 placed.

Used car dealers are making unusual profits in their dealings. Prices for second hand cars which normally ranged from \$150 to \$1,000 are commanding \$300 to \$1,800. It is the used car dealers who are making the profits while the men who sell new machines are falling far behind the average.

In an effort to have the cars delivered here early in the spring, the Automobile club of Rochester will organize a committee at the next meeting of the organization to see that conditions are bettered along the railroads so that they will be able to get their machines through.

Officials of the New York Central Railroad Co. will be interviewed in an effort to have these trade conditions bettered. The Rochester Auto Trades association also has taken action along these lines.

NEW YORK FIRM IN BIG DEAL

New York, Nov. 22—Anticipating opening one of the largest salesrooms and service stations in New York, the Paige-Detroit Motor Car Co. has leased for ten years an entire block of Broadway frontage, between West 56th and 57th streets, in the heart of Automobile Row.

The property, owned by the Potter trust, extends back several hundred feet toward Eighth avenue.

As the first step in carrying out its plans, which eventually will cause a big "shake-up" in automotive trade locations, the Paige will take over May 1 next, the 56th street corner, for many years sales headquarters of the Studebaker. Later the Paige will take the Broadway space utilized as salesrooms of the Poertner Motor Car Co., the Saxon Motor Co. of New York, and the Jandorf Auto Co. Plans for using the latter sections of the property, together with that occupied by the United Motor Service Corp. on 56th Street, have not been completed.

It Sure Is Scarce

5-Lbs.-5 SUGAR FREE

Five pounds of Best Quality, White Granulated SUGAR, FREE to each purchaser of one of our . . .

International
MOTOR TRUCKS

ON
Thursday, Nov. 13, '19
ONLY ONE TRUCK TO A CUSTOMER

Come in and see all the Motor Trucks on Motor Truck Day. The more you see of the others, the more you will want the BEST—the INTERNATIONAL.

34, 1 1/2 — 2 Ton

International
MOTOR TRUCKS

For Sale by

J. T. RISSE

WE ACCEPT LIBERTY BONDS IN PAYMENT ON NEW CARS
Chariton Auto Co.
Overland, CHARITON, IOWA, Willys

Evidently sugar is just as scarce in Iowa as in other parts of the United States. The above advertisement, which appeared in the Chariton, Iowa, Herald-Patriot, indicates Iowa farmers are willing to go to some lengths to get sugar.

Boston Dealers Build

\$3,000,000 of Construction Going on in Hub's Motor Show

Tenants Snap Up New Salesrooms as Rapidly as They Are Completed By Builders

BOSTON, Nov. 21—With new buildings approximating about \$3,000,000 going up along Boston's motor row, and a number of new agencies being placed here, it is evident that the motor industry in Boston is enjoying a real boom. The dearth of space was a big handicap, particularly for those dealers who wished to take cars in winter to hold for the spring trade. For newcomers who wanted sales and service stations there was no chance to get places. This is being overcome, yet even now as soon as a new structure is started there are many tenants looking for it.

The Noyes-Buick Co., which wholesales Buick cars and G. M. C. trucks for New England, is erecting one of the largest buildings ever put up for the motor trade here at a cost of about \$400,000. It is on Commonwealth avenue. The sales and service station being erected for John H. Johnson of the Buick Co., retail dealer for the city, which is nearby, represents about \$250,000 more. Another place nearing completion is the three-story building for the C. S. Henshaw Co., Dodge Bros. agents for eastern Massachusetts. There is also a big building for the C. E. Fay-Allen Co., which is to house the Maxwell and Chalmers lines in the near future.

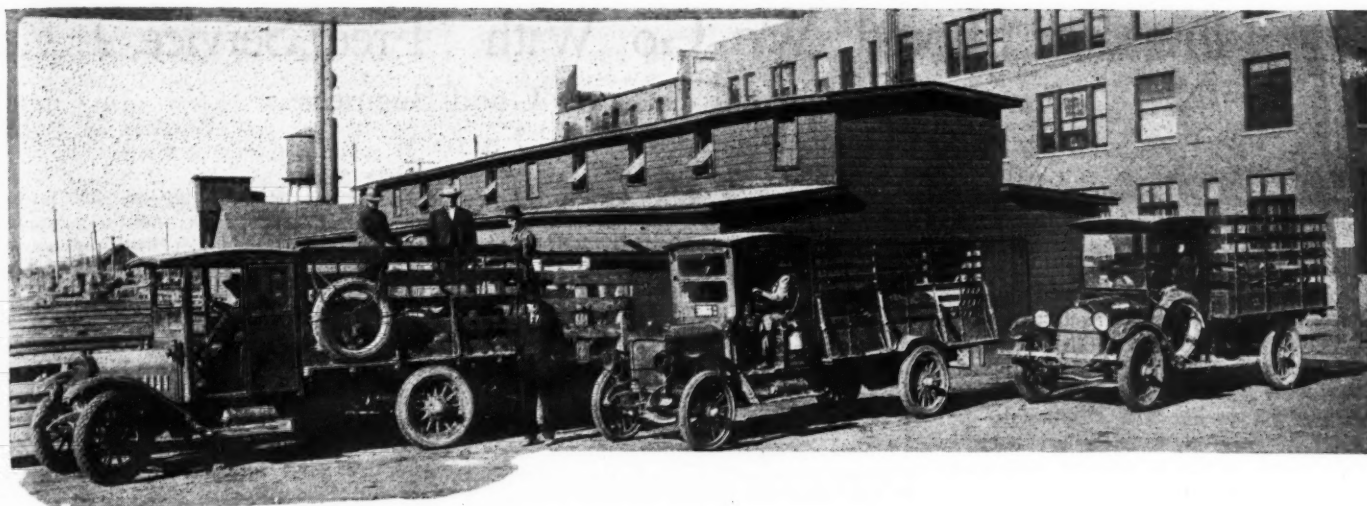
Nearby is another motor home where the Atlantic Auto Co. will retail the Liberty cars. Plans have also been approved for a large edifice for the Cadillac Automobile Co. The Master Truck Co. and the Signal Truck Co. have new buildings, too, with the others.

A big garage worth \$1,250,000 is being finished on Eliot street, another large one is ready for occupancy on St. Marys street, a third on Charles street and fourth on Westland avenue.

CURTISS RESIGNS AS SPLITDORF HEAD

New York, Nov. 21—C. W. Curtiss has resigned his position as director and general manager of the Splitdorf Electrical Co. to take charge of the affairs of a large automobile accessory company, whose headquarters will be located in Newark, New Jersey. The company with which Mr. Curtiss is to become identified, will proceed with the erection of a large plant to take care of the expansion of a business of tremendous proportions and of far-reaching import to the automotive industry.

R. W. Sutherland, secretary of the company, has taken over Curtiss' former duties. F. C. Manning becomes vice-president in charge of factory sales.



Farm trucks delivering stock to yards.

How Farm Trucks Increase Meat Supply

O show the progress being made in conserving food at the producing end, Swift & Co., Chicago packer, has found that motor trucks are being used by farmers now in marketing farm animals and produce to a rapidly increasing extent. It found that, by comparing hog receipts into three markets via auto truck during six months in 1918 with a corresponding period in 1919, the volume brought by motor in the current year is 33 per cent greater than in 1918. The markets considered are Sioux City, South St. Joseph and Omaha.

Markets Selected As Typical

These markets were not arbitrarily selected because of peculiar conditions. Data had been kept at these points which most readily lent itself to comparisons. Observations at Kansas City, East St. Louis and Denver indicate the same tendency to haul increasing numbers of hogs to market by motor truck.

The situation at Sioux City is particularly illuminating. The stock yards at this point received 21,531 "driven in" hogs

in six months, October to March, 1917-18. In the corresponding period of 1918-19, the "driven in" receipts were 40,274. This is an increase of 268 carloads, or 91 per cent.

"Few cattle are brought in by motor trucks or teams," explained F. L. Eaton, president of the Sioux City stock yards company. "Some calves are brought that way and a few sheep, but the motor truck business is represented almost entirely by the increase in hog receipts. Probably fewer hogs are brought in horse drawn wagons than in former years."

Hogs are being marketed at Sioux City via motor truck from distances up to 30 miles. With better roads it is agreed that the zone can be increased to 75 miles.

All indications point to a continued increase in this business. In the immediate vicinity of Sioux City nearly every county has voted for hard surfaced roads, and when these are completed receipts by motor truck will be much greater than at present.

In St. Joseph the increase has been 42

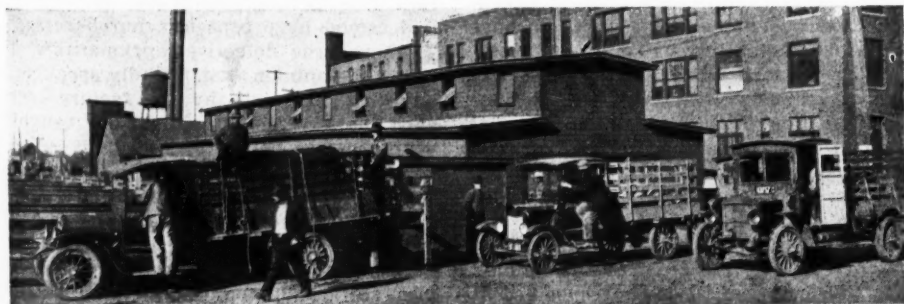
per cent and in Omaha 16 per cent. South St. Paul, also an important hog center, shows an increase of 25 per cent in driven in hogs of 1919 over 1918.

Since farmers, in utilizing the motor truck, bring their hogs in at night when it is cool, some markets, notably Omaha, have a night force to further this conservation.

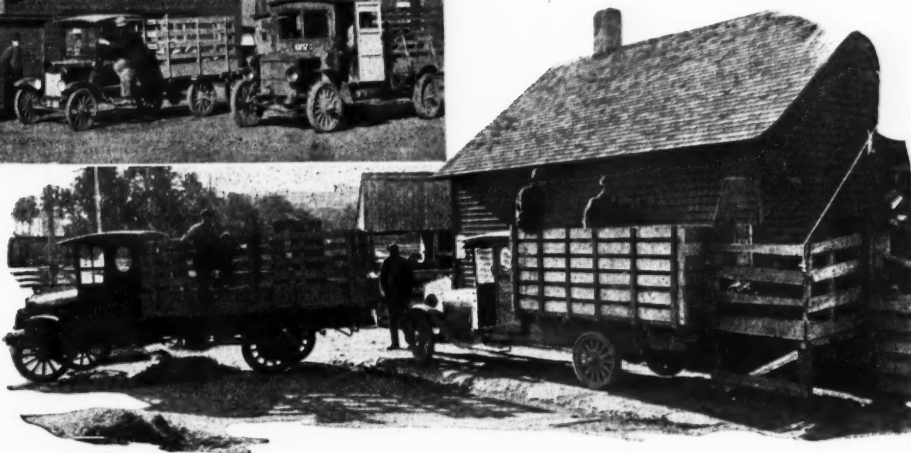
Big Opportunities Presented By Farms

In addition, results would show that automobiles carrying produce to Swift & Co.'s widely scattered produce plants are now scurrying toward the local markets with activity even greater than in the hog department.

These effects of the introduction of the truck into the farming communities reveal the broad vista of possibilities. The opportunity is being seized. The National Automobile Chamber of Commerce has appointed a "Rural Motor Express Committee," which is charged with investigating the possibilities of improving facilities for marketing farm products. Milwaukee announces that it is already getting its milk supply from a radius of 25 miles from the city by motor truck transportation. The State Railway Commission of Nebraska is now solving the problems of equitable rates in order to keep pace with the development of the truck transportation in that state.



Bringing the pig to market by motor truck. The start and finish of a load of live stock from producer to packer



How Far Should We Go With "Free Service"?

Extent to Which It Constitutes Good Business for Dealer, Distributor and Factory

By J. B. BRAY

Service Manager, Grant Motor Car Corp.

THIS subject of free service is one of considerable interest and importance manufacturer, distributor, dealer and owner.

Five or ten years ago any one purchasing a passenger car or truck was probably entitled to considerable free service because vehicles, as manufactured then, were far from perfect, but with the coming of the modern automobile and motor truck, free service, as generally understood today, is neither necessary nor is it good business.

WHAT IS FREE SERVICE?

Free service is gratis work performed on cars or trucks during the early period of their operation and is generally made necessary by one of the following causes:

1. Faulty design and defective material or workmanship (including inspection) on the part of the manufacturer.
2. Failure of the distributor or dealer to tune up and inspect vehicle before making delivery.
3. The fact that the majority of retail salesmen lead prospective purchasers to believe that their machines will be "taken care of" for 30, 60 or 90 days, as the case may be.

As regards faulty design, which occurs in the best-regulated manufacturing families, this is one of the hardest points for the factory service organization to deal with.

Naturally all letters containing complaints or troubles are referred to the service department and therefore the service manager is in closer touch with the weak points of the product than any one else and, therefore, when responsible dealers call attention to any weaknesses which the factory service manager knows from experience exist, he is faced with the problem of replacing the weak parts with parts which will render satisfactory service at a minimum expense to all concerned.

The matter of the charges for the parts can readily be settled as coming under that section of the warranty relating to defective material, but who should assume the labor expense?

Possibly the trouble develops in the first few days of operation of the car or truck, or, in these days of frequent and lengthy "drive aways," during the actual driving home of the machine by the dealer.

In the first case, the owner very naturally expects his car or truck made right without charge to him (which places the labor expense on the dealer).

In the second case the average distributor or dealer will repair the ma-

There is no question but that a satisfied owner is the best possible advertisement, yet if we have to give away something for nothing to obtain satisfied owners, then we are getting away to a bad start. Furthermore, it has been my experience that the more free work performed for the average owner, the more is expected and the less respect they have for you and the product you are manufacturing or selling. This paper which was read before the N. A. C. C. Service Manager's Convention last week has some good ideas as to why free service should not exist.

chine and report the trouble to the factory (which in most cases again places the expense on the dealer).

In the earlier days of our business the factory could send mechanics to the large distributing centers to install replacement parts necessitated by faulty design, but this is not practicable with the volume production of today.

I am firmly opposed to a policy which would in any way bind the manufacturer to make outside labor allowances, yet nevertheless I do feel the need of something tangible to offer the dealer in cases of this kind.

Of course, exceptions can be made to all rules, but this is a dangerous rule to tamper with, as once labor claims are allowed to a dealer by the factory, it is difficult to refuse similar claims made later.

Of course, it is still possible to send mechanics into the field and I believe all manufacturers still maintain some territory mechanics, but only in exceptional circumstances does it pay to have these men actually repair cars or trucks.

As regards defective material, this is not an extensive source of trouble, once a distinction is made between material that is defective and material that fails to stand up on account of faulty design. I believe that the dealer can well afford to install, without labor charges, replacement parts furnished gratis by the factory. However, I am of the opinion that the period of 90 days as specified at present in the Service Policy should be changed as regards labor only.

I feel that a definite driving distance of 500 miles should be substituted in place of the period of ninety days and that it would be good business to charge for all labor performed on cars and trucks after they have been driven 500 miles.

This for the reason that it is not uncommon nowadays for a passenger car

to be driven between 400 and 500 miles in a period of 90 days and the average city mileage in the spring and summer season is probably above 3000 miles in the first three months of operation, whereas a farmer or buyer living in a rural section seldom drives more than 5000 miles in a season.

Therefore, I believe that it is good business for the dealer to pay labor charges connected with replacement of defective parts for a limited period and

FREE SERVICE UNNECESSARY

It would therefore seem as if free service is not necessary and can be dispensed with through an educational campaign carried out along the following lines:

1. For manufacturers to further perfect their design before placing cars on the market. To subject experimental cars to more thorough and longer tests under normal and not special conditions and to build up their inspection force to the strongest possible point.

2. For distributors and dealers to see that proper attention is given to new cars and trucks when received from the factory and to see that the owners are thoroughly instructed in the care and operation of the same before driving vehicles away.

3. For distributors and dealers to make clear to their retail salesmen that they are selling passenger cars or trucks and not free service and that when they are questioned as to the amount of free service given with the machine they should make clear to the prospective buyer that "there is no such animal."

that this period should be thoroughly understood by prospective purchasers.

As regards defective workmanship, I am of the opinion that, broadly speaking, anything that gets by the factory test and final inspection should be caught by the dealer before making delivery to the owner.

We now come to the failure of the distributor or dealer to carefully check over and tune up the car prior to delivering the same. This should be done just as systematically and thoroughly as at the factory and by a printed list.

An hour's labor at this stage will frequently save several hours' labor later with the consequent inconvenience to the owner, loss of prestige, etc.

A practice which should particularly be condemned is that of delivering cars to the owner when the same are known to be out of adjustment with statements such as, "it will get better as you run it in, etc."

We now have to deal with the fact that the majority of retail salesmen lead prospective buyers to believe that they are going to get free labor on their cars and trucks for an indefinite period. This is probably the greatest single cause of our free service problem today. It is also the one for which there is the least excuse and will undoubtedly be the most difficult to overcome.

It should be possible for salesmen to take the position that the cars or trucks that they are selling have been thoroughly tested and adjusted and that the same are ready for continuous service and that further they should impress new owners that the successful operation of their cars or trucks will entirely depend upon the attention and care which they receive.

With the discontinuance of free service, the need for more capable and reliable paid service will be felt more strongly than ever before and I believe that this is one of the greatest needs of our business today. The average buyer would prefer to pay cash for com-

petent labor rather than receive incompetent labor for nothing. In connection with more capable paid labor will be felt the need of flat figures for repair operations of all kinds.

In conclusion it would seem that manufacturing passenger cars and trucks principally to be used for business purposes and selling the same largely to business people has brought home the fact that they are willing to pay for what they get; and they are not looking for something for nothing, but they do want value for their money.

I am of the opinion that our present policy is wrong when we state that we will, through our dealers, make inspections and adjustments for a period of 30 days without charge. In the first place, a period of time is not an equitable proposition and in the second place the practice of making free adjustments for thirty days on any piece of mechanism as complicated as, and subjected to as much abuse as an automobile or motor truck is not good business.

I believe that in the near future dealers will have to take the position that all cars and trucks are in proper adjustment and first-class condition when delivered by them and that any adjustments or repairs later becoming necessary will be made at the owner's expense; this with the single exception of defective material occurring in the first 500 miles which the factory must replace without charge. This may be somewhat arbitrary, but in reality it is the attitude now assumed by the manufacturer.

Moreover, it is perfectly fair and businesslike, providing that it is clearly understood in advance by all owners and so specified in the service policy.

I do not believe the sales of any responsible concern could be injured by a clean cut statement of this kind.

The result of the abolition of free adjustments and inspections would be an increased amount of labor on the car or truck by the owner or operator and a consequent increase in their interest and satisfaction.

Independent Repairman From Factory Standpoint

Appointment of Authorized Garages in Territory Which Has Not Been Allotted Distributors Is Suggested

BY L. C. VOYLES,

(Service Manager, Nordyke and Marmon Co.)

IT IS the ideal of every automobile manufacturer to have every owner of his automobile satisfied and, while all appreciate that this is not entirely possible, the nearer we approach that ideal the better.

Our position in this matter reminds me of the story of the Kentuckian who was making his annual visit to market to dispose of his produce. His team of oxen was somewhat weary with the two-days' journey. When he reached the city limits he was confronted with the sign: "Speed limit, fifteen miles per hour." He pulled his whiskers a moment in silent meditation, and then drawled out to his oxen, "Well, I know darn well we'll never make it, but we'll do our doggone best."

While we may not be able to reach our ideal, yet we are doing our best.

Were it possible for every owner to bring his car to the factory and have adjustments and repairs made there, the possibilities of reaching our ideal would be much greater, but that is out of the question with factories which produce in quantities, or those whose product is distributed over a great extent of territory. It therefore becomes necessary to provide some means whereby the purchaser of an automobile in a distant section can get as nearly as possible factory attention. The most practical and satisfactory plan found so far is to make it a part of the duty of the dealer, having the sales franchise in a certain territory to provide the necessary facilities for the proper ren-

Editor's Note—This is another of the papers presented at the N. A. C. C. Service Manager's Convention. L. C. Voyles takes the stand that the authorized service station is usually the best. Opinions differ on this as to the relative value of the independent garageman to the industry.

dation of service after the car is sold. If he is in a position to repair his owners' cars promptly, efficiently and economically, he can truthfully say, in my opinion, that he renders good service.

To do this he must have proper shop space, sufficient equipment of tools,—in all probabilities special equipment must be provided for certain operations,—an efficient mechanical force, and an adequate stock of parts. Formerly as much attention was not paid to this phase of the business as should have been, and it is from this evil we are suffering today.

After the dealer has met the above requirements, which usually mean an investment of several thousand dollars, is it fair to him, to the manufacturer or to the owner to encourage an independent repair shop in that dealer's territory? I think not.

Two classes of owners are affected by the independent garage or repair man. The first takes in the owner who deliberately goes to his repair man on account of some difference with the dealer; and the second is the stranger or tourist who does not know the dealer. This latter may be influenced by signs or other advertising on the part of the so-called independent garage or repair man.

If the factory received too large a per-

centage of complaints from a certain territory on the service rendered by the dealer, it should make it the subject of an investigation to determine the cause of the trouble and remove it. It may be in the personnel of the shop. Often mechanics imagine they know more about designing and building a car than the engineering department ever thought of knowing. He may be trying to redesign and rebuild the cars, instead of repairing them. It may be that the car in this particular location is called upon to meet conditions not anticipated and in order to meet them successfully, it will require certain changes in the construction on the part of the factory.

This would be particularly true on new models. But, whatever the cause, it is the factory's duty to correct it through the dealer, rather than attempt to remedy it by encouraging independent garages and repair shops. This can only mean admitting that the dealer's service was not what it should be and it was not possible for the factory to correct it. Students of political economy tell us that the surest cure for Bolshevism is a full stomach. It seems to me that, similarly, that the surest cure for the independent garage and repair man is to have our dealers' organization so efficient that independents will be unnecessary.

The time is not far distant when cars will be sold through the back door instead of the front door. I mean by this that

the service the dealer renders will determine his sales success. Even now this plays an important part in the case of a reorder. The wide-awake dealer is ready and eager to do anything that will increase his service, which means sales for him, and at the same time contributes to the satisfaction of his owners. It is clear that this is a sales as well as a service problem and calls for the closest co-operation between the sales and service department of the factory.

Success of Repairman

The independent repair man's existence and his success depends in a large measure upon differences between owners and dealers, and, rather than increase these differences by encouraging the independent garage, efforts should be made by the factory to reduce them by co-operating with and encouraging the dealer. All of you have received letters from some owners telling you of dealer failings, how it was necessary to take the car to a friend who was an excellent mechanic. His friend tells him this, that and the other thing is wrong with the car, and to correct it will mean quite an extensive repair bill. Then he asks what the factory thinks about it and, in some instances, requests the factory to assume part or all of the expense.

Why shouldn't this repair man tell him this? Self-preservation is one of the first laws of nature, and the repair man, whose existence is dependent upon the number of cars he can work on, is selling his product in telling an owner these things. Second, if the owner receives a letter from the factory, telling him that the dealer, in his city is qualified to take his car and make an examination, and tell him whether or not the work recommended is absolutely necessary and that the dealer is interested in his success with the car, that his men are intimately acquainted with the construction of his car, that he has the necessary equipment to look after his needs, the chances are this owner will stop, look and listen, before he proceeds. If the dealer can't do this, he isn't a dealer in the strict sense of the word, and this again is strictly the fault of the factory. If, at the same time this letter is written the owner, another is addressed to the dealer, telling him of the case, about ninety-nine times out of a hundred it will be found that the dealer hadn't been given an opportunity to look after the car.

Often the proprietor of the independent garage is a former employe of the dealer, who decides to go into business for himself and, logically, figures he can take more or less of the dealer's trade away from his former employer, which is true, as there is always the personal element to be considered. While we have no quarrel to pick with him for having ambition enough to get into business for himself, yet we must necessarily protect our own interests. There are, no doubt, cases where such men can make amicable arrangements with the dealer and can handle a certain class of work to the advantage

of all concerned; but again, this should be worked out through the dealer and the dealer should be held responsible for the service in his territory. It is the unreliable or incompetent repair man and the fellow who has no interest in the owner other than the money he can get from him, that we must necessarily object to and protect ourselves against.

We can not refuse outright to sell him parts, but, if no discount is allowed and the owner finds that he can get his parts more promptly through the dealer, it is not going to be long until he will decide it is to his advantage to have the dealer look after his car. Owners have a right to take their cars wherever they choose, but they also have a right, by so doing, to inherit the expense and inconvenience occasioned by such action. In many cases the former employe will feel, in view of his knowledge, that he can give as good or better work than the dealer's organization, and will feel warranted in word-ing his signs to lead the public to believe

FACTORY MUST SUPPORT DEALER SERVICE

The automobile business has settled to a more solid foundation and one of the most valuable lessons learned is that a dealer is just as much a legitimate merchant as an other line of business; that in a large measure the reputation of the car itself is judged by the reputation of the dealer. He must be a business man in every sense of the word, and capable of caring for the wants and needs of his owners. Having met these qualifications, he should have every support of the factory whose product he sells, instead of adding still more to the general confusion and dissatisfaction by the encouragement of the independent garage and repair man on the part of the factory.

that his is an official service station. There is a possibility of legal action, if it can be proved this is done with the intent to deceive, but this is an expensive proposition and is apt to create a false impression that this particular party is being discriminated against and this will tend to aggravate conditions instead of relieving them as we are all trying to do. The most effective means of combating this is for the dealer to have the various departments of his service so well organized and so thoroughly equipped that he can render better value received than can any small repair shop.

In many instances small repair shops will send the owner on whose car they are working around to the dealer to buy parts, feeling that the owner can buy them to better advantage. This gives the dealer an opportunity to resell his service to that owner. He may have changed because of some misunderstanding. This is an opportunity to win him back and should not be overlooked or neglected by the dealer. A dissatisfied owner is a

liability with no means of computing the exact damage he can do, while a satisfied owner is an asset, with equal difficulties of computing his true worth.

All of the above has been on the basis of figuring on a normal dealer in an ordinary territory. There may be cases in a dealer's territory, through having a large or sparsely settled territory, where it is impractical to have all cars brought to him for attention and on account of the shortage of cars, or for various reasons, he does not wish to establish subdealers. In that case it should be obligatory on the part of the dealer to arrange through some local repair shop for proper service to owners. This arrangement should be made by the dealer, not by the factory, and the dealer should be held responsible by the factory. The dealer should be sure his agent is sufficiently familiar with the working parts of the car and has sufficient equipment properly to care for the customer's wants. If there is any doubt he should either arrange for his own men to spend sufficient time with this agent or have the latter spend the necessary time in his shop to teach him the individual construction of the car in question.

Another phase is in a large city like Chicago or New York it might not be practical, from either the owner's or dealer's standpoint, to have all cars brought to one point. The dealer can take the necessary steps to insure service to the owner or owners in all sections of the city and this should be the dealer's duty, if he is to fulfill his part in the plan of distribution and merchandising.

Cars in Open Territory

The above has dealt with conditions assuming that there was a dealer, in control of a certain territory. There are cases where an owner may have purchased a car from a dealer, but lives in what is known to the trade as open territory. Here is a condition that should receive the careful attention of the territorial representative. If there are sufficient owners in a certain section it may be advisable to arrange for service to them through a local man, but it should be on a basis of a contract to that effect. In other words, that man should be responsible to those owners for the performance of certain obligations and the factory in turn should be in a position to insist that he fulfill his contract to the letter, instead of permitting an owner to get along as best he can.

Not many years ago a dealer was not sure from one day to the next just where he stood relative to his contract. Very often, suddenly and without warning, his contract was cancelled, a new dealer was appointed, the owners who had bought from the former dealer felt they could not and would not receive proper service from the new dealer. Hence, they began taking their cars to other places for work. Thus the factories themselves are largely responsible for present conditions and, being responsible for them, it is their duty to do the major part in correcting them.

Profitable Distributor's Stock Management

How Much Stock Should Be Carried— Layout of Stock Room and Record Keeping

BY H. W. DREW

(Assistant Manager, Technical Service Department,
Packard Motor Car Co.)

THERE has been a slight reluctance on the part of distributors and dealers to carry adequate assortments of parts. It can be done profitably if this business is handled properly. Distributors will accept eagerly any advice which will produce this result.

This plan is a method of figuring the logical stock investment which can be followed by any distributor by use of his own records. With regard to any given case:—

The first consideration is the number of vehicles in the territory.

The second is the total parts business per year, which should be easily ascertained from any distributor's books.

The third, dividing the second by the first we have the important factor which shows the average business

per vehicle per year. This figure will vary in any territory in proportion to the predominance of certain types of car, the nature of the service, whether it is easy or hard, and the number of customers who obtain parts from outside.

The fourth consideration is the turnover; that is, the total yearly parts business divided by the stock to be carried. If the turnover is three or more (that is, 300 per cent or more), the parts business usually is profitable. Of course, the greater the turnover can be made the more profitable the business, but beyond a certain point the efficiency of the shop and satisfaction to customers will be greatly impaired. Except in certain cases, experience has shown that if the turnover is greater than four, the results are unsatisfactory.

Turnover Means Profit

The factors to be considered in determining the turnover are the distance from the nearest large center supplying stock, the size of that central stock, the condition of the local service, and the efficiency of the stock-room and the stock supply system. You will be interested to know that at the Packard factory we have worked out a method of gaging accurately each of these factory which works excellently, but is too complicated to explain here.

The amount of space necessary is roughly 60 to 70 sq. ft. of area per \$1,000. of stock. In the large stock-room this will include the office, receiving and shipping departments. In the small stock extra space must be provided for these features.

The location with respect to other branches of the business is of vital importance, and should be given first consideration, even at the sacrifice of

other manifest conveniences in the service station or repair shop.

Foremost consideration is to have the stock-room immediately accessible to the repair shop. You have all seen mechanics lined up three deep at the stock-room window losing valuable time and productive effort obtaining parts desired. One way to minimize this wasted time is by making the stockroom accessible. Bringing the stock to the work is one of the big efficiency lessons which the automobile manufacturer has given to industry and it is up to us to apply this prin-

The automobile spare parts business in the United States is estimated at \$250,000,000 per year. The parts stocks continuously carried on hand by distributors is about \$60,000,000. The effective value of this investment could be doubled by efficient methods. This paper was read at the N. A. C. C. Service Managers' Convention held at Detroit, Nov. 10 to 12.

ciple to the service station. The stock-room location should also provide for sales direct to customers without interfering with shop work, and be convenient to the cashier. The sales value of an orderly stock-room is now receiving considerable attention. Some dealers make it a show feature of their establishments.

Having determined the location, the general arrangement must be carefully considered. Besides the stock itself, five elements enter into the problem, stock receiving, stock packing and shipping, delivery to shop, delivery to customers and stockroom office. The closer these elements can be conveniently grouped the better the result, particularly in smaller stations. Up to a considerable size one person can handle shop and customer deliveries. Under these circumstances it is extremely important to have the two delivery windows close together to assure prompt attention and avoid walking. If necessary a call-bell should be used. In the larger stations, receiving and shipping should be in a room by themselves to avoid confusion and keep the wood, paper, and excelsior from littering up the stock-room.

Now coming to the carrying of the stock itself. It is convenient to classify the containers used into five groups. First, the special small containers for small parts; such as, magneto and distributor parts, small special screws, etc. The small drawer type of con-

tainer about 2 inches by 3 inches by 12 inches, having several cross divisions furnishes a flexible, compact, safe and clean receptacle. One cabinet will provide for several hundred of such parts.

Second, the small standard bin. This is the main reliance of the stock-room. Fully 50 per cent of the total number of parts carried can be contained in a bin 6 inches by 6 inches by 10 inches. The commonest mistake in the past has been to provide too few bins of this size. It should be a bin not a drawer and should never have less than a 5 by 5 opening, so as to admit the hand freely. The depth should never be greater than 12 inches, 10 inches, 10 inches, or 8 inches better.

The third, the medium bin, about 1 cu. ft. in size. These are on the two lower tiers of the standard small bins, for parts which, by size or quantity call for more room.

The fourth, the large bin, is usually 2 ft. deep and high, by 4 ft. long, mostly for carrying box goods; such as, inner tubes, paint supplies, stationery, etc. Few of these are required.

Special Size Bins

The last or special types, are racks for springs, wheels, fenders, etc., all of which call for special designs. In laying out the bins, ample aisles, uniform and easily movable bin sections, light, and accessibility will all be carefully considered by the trained stockkeeper. Proper numbering is important. Usually attempts to make part numbers and bin numbers correspond fail on account of varying part sizes. But often associated parts may be placed together; such as, valve rollers, holders, guides and pins. We have found it most convenient to have the entire bin sections carry letters,—each bin row numbered from left to right, and each successive row from the bottom starting a new hundred, just as hotel or office building rooms are numbered, with all third floor rooms in the three hundreds, etc. Thus bin No. B-317 means the bin section lettered "B", the third row from the bottom and seventeenth bin from the left. One stock-room claims a 20 per cent saving in time by this simple expedient.

Keeping an accurate stock record and using it intelligently to maintain the proper stock is the root of the stockkeeping problem. Without records the stock-room becomes chaos. One can take any stockkeeper who says he knows every piece in his stock-room, therefore needs no records, and show him where he has the same stock in

from two to five different places, and also show him parts which he is confident he does not have in stock. This by the simple expedient of the inventory.

The inventory thus becomes the starting point of the well-regulated stock-room. The usual methods are followed, simply listing on cards the quantity, piece number and bin number of each part, then arranging these cards by the piece number or symbol number as it is sometimes called.

We are now ready for the perpetual inventory card, which is the simple but comprehensive basis of the entire system, as illustrated. 99 per cent of all Packard distributors are now using this, or a similar form, and the commendations received regarding it, read like patent medicine advertisements. Having once used it, they wouldn't be without it.

Perpetual Inventory Essential

Assuming now that we have an accurate inventory of the stock on hand and a record of the activity of each part as shown in the disbursement column, we are faced with the problem of just how to use this record in maintaining our stock, bearing in mind that over-ordering ties up money without returns and under-ordering causes dissatisfied customers, delays and shop losses.

We have two conditions to face, first when the demand is considerable and fairly uniform, and second when the demand is erratic or not great enough to be accurately gaged.

The first condition is readily covered by a system of maximums and minimums. The minimum or danger limit is the point when the stock is sufficient only to last until a new supply can be received. Thus, if two months is required to get stock from the source of supply and a part is being consumed at the rate of six per month, a new supply must be ordered when the amount on hand gets down to twelve, the minimum in this case.

The maximum is the amount to be ordered and is also based on the rate of consumption. For small inexpensive parts listing below 50 cents or \$1 we recommend ordering a 12 months supply, to avoid continuous ordering and handling, in proportion to the value of the stock involved. For medium priced parts from \$1 to \$5, we recommend a 6 months maximum, and for expensive parts, above \$5 a three or four months supply. This last is a safe method of conserving the investment on large parts, because they are used mostly on accident or general overhaul work where they can be ordered specially if necessary. Most such parts are usually slow moving.

By the above method it will readily be seen that it should be possible to supply practically 100 per cent of stock from the distributors' stock-room on demand. This is being done by our large distributors on a large number

of parts. But unfortunately, our moderate sized establishments find that a considerable proportion of their stock falls in the second class in which the demand is so erratic or so light that the card record cannot be relied upon. Up to recently the only dependence in such cases was the good judgment of the stockkeeper, and in some cases this judgment has been developed to an uncanny degree. They have consistently supplied 90 per cent or more from moderate stocks. Other stock-rooms not so fortunate in the services of long-trained, gifted individuals, have suffered great losses thru this lack.

So the factory has developed and printed the "Guide for Regulating Parts Stocks." This guide simply gives the distributor the factory's experience with regard to a large number of active parts in such a way that it can be applied to his own ordering problem. For example, a dealer with 100 Twin Six Packard cars in his territory has used two of a certain part costing \$5 in the last 3 months and has exhausted his supply. Previous to that he used none in a year.

Since this experience is inconclusive he refers to the guide and finds that the proper amount to order is two. He may have an exact parallel case on a different part where the guide would show four, or in another, none. If he follows the guide in each case he is sure to profit, because in the long run his experience is sure to parallel with the factory because the factory record represents the grand average experience of the entire country.

The guide has served as a great aid in determining what parts are logical to return to the factory for credit. It has also been invaluable in making up lists of stock to start off a new small dealer for any given territory, especially in preparing assortments to accompany initial shipments to foreign dealers.

Please understand that this guide does not replace the good old judgment method of ordering, it simply supplements and improves it.

Personnel

This brings us to a consideration of the human element in the stockkeeping problem. No system, however well devised and worked out can be entirely automatic, and there are so many phases of this business that the good judgment of an intelligent manager must be available if satisfactory results are to be obtained. In no branch of our business is so great financial business completely in the hands of a \$100 man. Such men almost invariably lose to the company many times their salary in injudicious ordering alone.

To operate successfully any fair sized stock-room, the stock manager must have a wide range of intellectual and personal equipment. On the human side he must be scrupulously honest, for temptations are great and the results of loose morals disastrous. He

must be loyal to the company and cooperate with other departments. He must be courteous to customers and diligent in meeting their requirements. He must be enough of an executive to command the respect of assistants and to delegate detail work to them.

On the mental side, he must first of all have a good knowledge of automobile mechanics and be fully aware of the use and mechanical characteristics of the parts. He must act as a safety valve for the shopmen, and prevent them from "going crazy" as the saying goes, with regard to the necessity of changing large numbers of certain parts. The Parts Guide is a valuable aid in this direction.

Contrary to general opinion he need not have an excellent memory. On the other hand, it may be a handicap in postponing the inevitable but desirable time when stock will be found entirely by the card record.

Records Facilitate Ordering

He must have an appreciation of the value of needed records, and must use them; at the same time he must recognize and avoid the pitfalls of red-tape.

He must know some accounting. The progressive stockkeeper knows how to use the data on the amount of stock to be carried as outlined in the beginning of this paper.

He must have a keen appreciation of the value of money and a real desire to conserve it. He will know that parts are so much dollars and cents, and will no more kick around a piston pin bushing than he would a 50-cent piece, its exact equivalent. He will order parts by the cheapest route whenever possible, and avoid telegrams by anticipating stock requirements.

There are, of course, not many such paragons available; none at all, you will agree, who can be permanently employed at a pittance these days. The lesson for us it seems to me is, first to convince distributors that a good salary for the right man in such a position is a good investment. Then we must train young men who are available for such work. At the Packard plant we are developing a stockkeepers school which we believe will bring good returns in better stockkeeping, and we have specialists continually advising and assisting dealers in improving their stock efficiency.

GIVES PATRONS KEYS TO GARAGE

Victoria, B. C. Nov. 24—In order that the patrons of the Masters' Garage on View Street, may be able to get their cars at any hour of the day or night, Gus Masters has lately inaugurated a pass key system for tenants. By this means a 24-hour service can be given to motorists garaging in the big building without piling up a heavy overhead cost for night workers, this saving reacting in favor of the car owner in lower charges than would otherwise be necessary.

Dealer Must Choose Tractor To Suit His Territory

The Sixth of a Series

By FRED W. LOOMIS
(Motor Age Editorial Staff)

Selling tractors is a business and an art. In this series of articles on tractor selling and service, Motor Age is giving its readers the benefit of the experience of 30 years in the tractor and implement field of Mr. Loomis.

This, the sixth of the series, deals with valuable criticisms as an asset in the tractor business.

Other articles, which will appear in Motor Age in future numbers, will deal with other phases of the tractor selling field.

AT the risk of repeating some things which already have been touched upon in this series something more will be said here about the selection of a tractor to sell. As respects this phase of the subject there are two theories. They are represented respectively by two classes of tractor manufacturers. On the one hand is the manufacturer who makes but one type and size of tractor and who desires the dealer to concentrate all his selling energy on that one. On the other hand is the manufacturer who makes a full line of machines, not often of differing types, but differing in sizes, and wants the dealer to sell the whole line. Both have cogent arguments to present which the prospective tractor dealer will do well to consider because they have a bearing on the important matter of tractor selection.

At the very outset, however, let us disabuse our minds of an impression which still is somewhat prevalent, although it is not nearly as general as once it was. This is that there is, or will be, one universal standardized type of tractor which shall be adaptable to any and all conditions. There is no such thing and there never will be. Upon the contrary there is a decided tendency toward specialization and to a multiplicity of types and sizes, which bids fair to be a permanent characteristic of the business.

No Tractor for All Needs

The maker of one type and size of tractor comes dangerously near at times to representing his machine to be the tractor for all needs. The dealer must steel himself against becoming convinced that it is. It is true that certain makes of tractors are being sold almost universally in this country and that they are being worked, a distinction must be drawn here between being worked and working, under a great variety of conditions. It is true, also, that in almost all localities these commonly sold tractors are giving a fair measure of satisfaction, considering the diversity of conditions under which they are forced to perform. But in many instances the satisfaction would be flattered by calling it measurable.

A close examination of tractor experience extending over many states and covering many conditions reveals that fact that tractors of unvarying design meet with varying success. In some localities they leave little to be desired. Almost any farmer can so adapt one to his work that it will meet his conditions with reasonable satisfac-

tion. In other localities satisfaction is the exception and many combinations of circumstances are to be found where a machine of this particular type and size does not do good work. No reference is intended here to any particular tractor now on the market; the statement may be applied generally to any machine.

This may be said to be the universal rule. It is impossible for the same machine to be equally successful everywhere and the manufacturer who thinks he can get across with the notion that his tractor will do that has another big guess coming. It can't be done. Some come nearer doing it than others, but none makes a complete success of it.

In an article such as this it is manifestly impossible to give examples or to mention instances. The reader must be satisfied with the statement that such there are and that the writer would not be so emphatic were he not sure of his facts. Speaking directly to the individual dealer, he would say, if the dealer does business in a section where he can safely and conscientiously sell one type and size of machine to meet all conditions, then that dealer is playing in mighty big luck. He has far more of a snap in the tractor business than a majority of dealers have and is to be congratulated.

One Type Usually Predominates

However this may be, it remains true that in every locality there is one type or one size which is predominantly the machine for that section. It meets conditions far more frequently than does any other and it is therefore easier and safer to sell than is any variant of either type or size. This is the machine every dealer should try to

discover and this is the machine he should make his leader.

This does not mean that only one make of tractor is particularly adapted for any one locality. Far from that. It means only that a certain type or size is best adapted. There may be a score or more of different tractors conforming in a general way as respects type and corresponding almost exactly as respects size, and any one of these will be a machine worthy the best efforts of the local dealer.

Three or four years ago when the tractor business was younger than it is now and when more or less experimenting with types and sizes was under way, the selection of the right machine for a given locality presented a great deal of guess work. The writer has visited parts of the country where the popular type and size both have changed several times within the last 5 years. Nor was this due to any caprice upon the part of the farmer but was attributed to the fact that one type or one size after another demonstrated it was not the best for the situation. Other localities are at present going through an identical process of trying out, but with an important difference.

Warn Dealers Not to Oversell

This difference is, that the manufacturers themselves, in the process of selling and testing out their machines, have got a broader and more accurate conception of both the capabilities and the limitations of the tractors they are trying to adapt. Such manufacturers are exercising more care and discrimination in the distribution of their machines and when there are conditions in a certain section of the country which experience tells them they can meet only with difficulty, they are chary about pushing their machines to the limit there. On the contrary, they are pushing harder in territory where they have made good and where they know in the light of their experience they can give the largest measure of satisfaction.

Furthermore, these manufacturers are laying the injunction upon their dealers not to oversell. They admit that there are certain conditions they have difficulty in meeting and they are instructing dealers either to avoid such conditions or to sell tractors in the midst of them with extreme caution. All of which is as it should be and all of which also makes it easier for the dealer to decide correctly.

In this connection it is interesting to note the development which has taken place in manufacturing in certain directions. There are a number of tractor companies in the field today which make a line of machines. These run the gamut of size from the baby tractor to the leviathan. There is far more diversity in size than there is in type. Commonly the tractors made by any particular concern do not depart far from a certain type recognized as typical with that concern. However, it is reported that plans are now under way by some concerns to be in the market next year with tractors which differ in type as well as in size. There is a manifest tendency toward diversification. This hardly will be in the direction of freak tractors, but in specialization along established lines so that certain manufacturers will have more machines to offer to meet differing conditions of use.

To us this looks like a recognition upon the part of the tractor manufacturers of the fact we are trying to emphasize, namely, that it is impossible to make one type or size of machine meet any and all conditions. It is noteworthy, too, that the companies which have gone the farthest in diversification are among those which have been in the tractor trade the longest and which have had the most experience.

But there are manufacturers and manufacturers. There are manufacturers who have had all degrees of experience from the most diverse to practically none as yet. The dealer must bear this fact in mind when he is importuned to take the agency for any particular machine. He must measure his own experience with that of the manufacturer who is trying to sell to him and he must strike a happy mean between the two.

But this article is addressed primarily to men who are new in the tractor business or to men who are contemplating going into the business. Such dealers very likely will say, then, they have had little or no experience of their own, how then can they measure up with the manufacturer? This is a very pertinent question, but it is one easy to answer.

Judge From Experience of Others

Hardly is there a locality in the whole of the United States wherein tractors have not been used to a greater or less extent during the last few years. It follows inevitably that in every locality there is a fund of experience upon which the dealer, be he old or new or prospective, can draw if he will. By tractor experience is meant farm experience, not necessarily selling experience. What the tractor has done, or what it has failed to do on the farm is the important thing and this every dealer can ascertain with a considerable degree of exactness if he is so inclined.

And here is something which may sound strange until it is considered:

the failures tractors have registered have far more informative value for the dealer than have the successes they have made.

In effect, this is a kind of judgment based upon negative evidence. Tractors in any given locality have failed, if they have failed at all, from one of two primary causes. Either the men who have tried to operate them have been hopelessly incompetent, or the machines themselves have not been adapted to conditions. In every case, any man of ordinary intelligence is able to distinguish between the two causes and to determine which is the more likely to be the true one.

Again, we take it to be a fair assumption that any man who goes into the tractor business is influenced far more by the desire to make tractor sales which shall prove to be satisfactory, than he is by the desire to make sales regardless of results. This being the case, the desire is foremost in his mind to select the right tractor, the one which will meet his customers' needs the best in a majority of cases, or to sell a line which practically will meet all local conditions regardless of what these may be.

Take Time For Investigation

The best way to reach a decision in this respect, in case the dealer is new and has no fund of experience upon which to draw, is to make inquiry among those farmers in his community who have owned tractors and who have had the actual experience. And here is where negative evidence is valuable.

The tractors which have failed point unerringly to the fact that they have encountered impossible conditions. The conditions being what they are, it may happen that the tractor was too small, or too big, or of the wrong type as respects tread or something like that. For it is a fact that unless the land sets practically on edge a tractor of some kind will work it. If the farmer has been unable to make his tractor work satisfactorily, assuming the failure is not his own fault of operation, then the type or size of machine with which he registered the failure is manifestly the size or type the dealer should avoid if there are many such conditions to meet in his territory. Conversely, the machine which has succeeded under similar conditions is approximately the one to select.

The dealer who will take the time to make some investigation of results in his vicinity hardly will go wrong if he allows himself to be guided by those results. If he does go wrong it will be by deliberate intent. Either he believes he can override experience or he permits his judgment to be perverted by the blandishments of someone with something to sell.

With the tractor developed to the point that has been reached; with the number of them there are in use in all sorts of conditions; with the

fund of experimental knowledge now at the command of the dealer, there is not the least excuse in the world for any dealer, be he old or new, making a very serious mistake in selecting the type and size of tractor he will make his leader in his particular locality.

Just as there are manufacturers who are insistent that the dealer shall sell exclusively one type and size of tractor, and other manufacturers who will insist just as strenuously that the dealer should carry a diversity of types and sizes, so there will be dealers addicted to one or the other of these two selling theories.

No Monopoly Possible

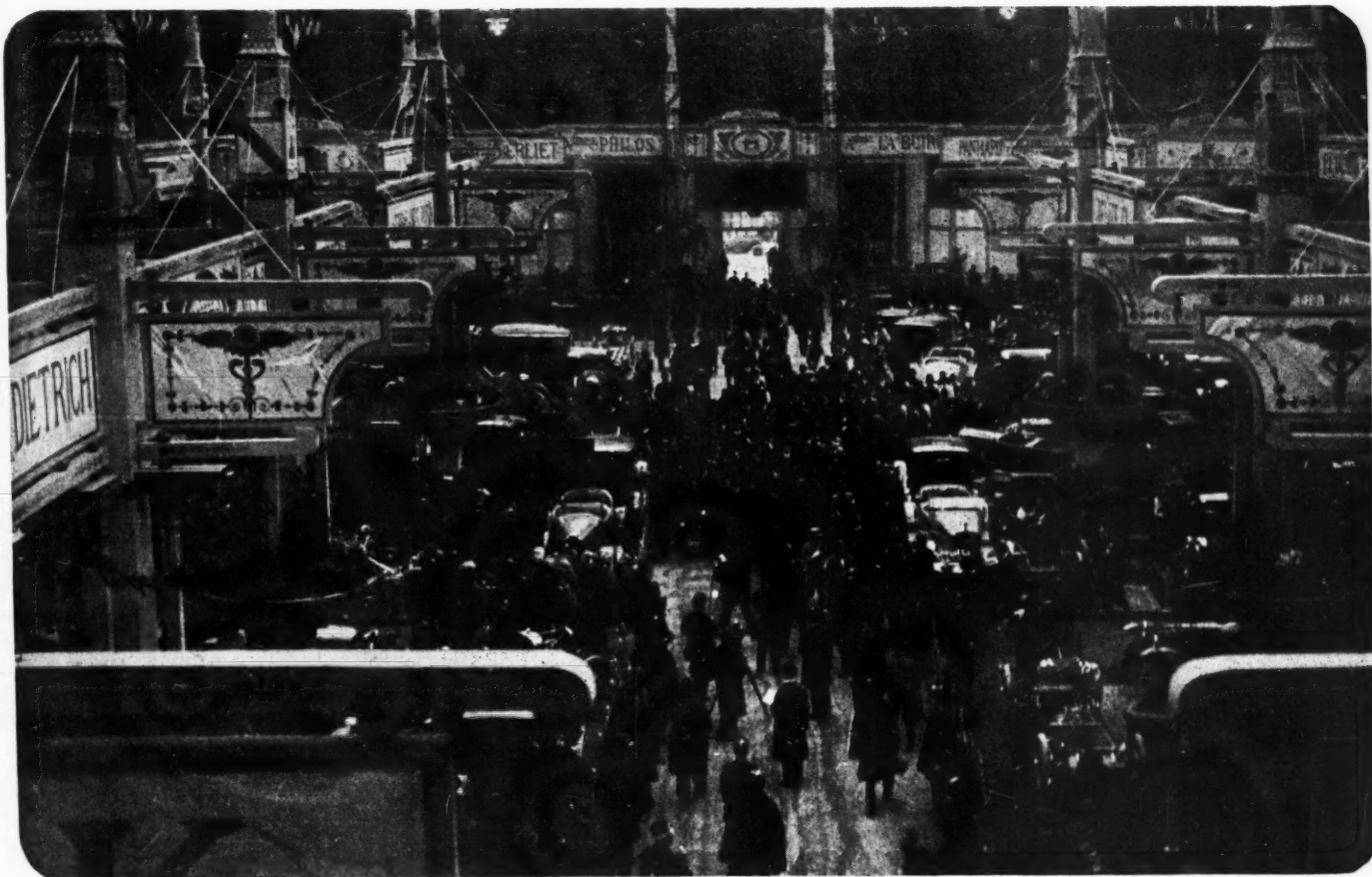
The dealer may as well make up his mind at the beginning that it will be impossible for him to sell all the tractors that are sold in his locality. He will get only his proportion of the orders, and this proportion will be large or small according to his own ability as a salesman, his perspicacity in picking his machine and other considerations too numerous to list here. But be his proportion large or small, it will be only a proportion at the best.

This being the case, it is up to the dealer to decide for himself whether he shall concentrate his attention and his efforts upon one machine, the one which in his judgment most nearly fits the average of conditions prevalent in his territory, and then be satisfied with selling that one machine to as many of the farmers in his locality as he can who have average conditions, or whether he will prefer doing something else. The something else he may prefer may be to handle a diversity of types and sizes so he can make a nearer approximation to individual need and thus meet more than average conditions.

Both types of dealers exist and both types are succeeding. It is just a matter of individual preference. Some men must concentrate if they are to achieve the largest measure of success. Other men are more versatile and can scatter their efforts and still be equally successful. No hard and fast rules can be laid down. It is a matter of personality and this each individual dealer must settle for himself.

HART-PARR DEALERS TO MEET

Charles City, Iowa, Nov. 24—Sixty dealers of the Omaha Hart-Parr company will meet in convention at Charles City, Iowa, Dec. 8 and 9, and the Hart-Parr company is making arrangements for a profitable convention as well as plenty of entertainment for the guests. The time will be taken up with instructive lectures on sales, advertising, repairing, production. Banquets will also be held. The dealers from Nebraska and western Iowa will make the trip in two Pullmans which will be sidetracked here during their stay in Charles City and the dealers will make their headquarters in them. Heating arrangements will be made for the Pullmans.



European Car Show Influence of American Design

Many Engineering Practices Heretofore Discountenanced Now Adopted Due to Changed Condition

By W. F. BRADLEY
(Motor Age editorial staff)

This is the third of Mr. Bradley's articles describing in detail some of the principal features of the Paris Automobile show. European engineers have adopted many American practices in their post-war models and have also brought forth some innovations which American designers probably will adopt for their own construction of future models, it is thought

FRONT wheel brakes are an important development shown in European post-war cars. They are used at present by Delage, Hispano-Suiza, Piccard-Pictet, Excelsior, Isotta-Fraschini, Bellanger and Elizalde. Several other makers are known to have decided on their adoption although they have not made any public announcement on this point. With the exception of Isotta-Fraschini, all the front wheel brakes are designed by Engineer Perrot and used under his license. There is a certain feeling that front wheel brakes are liable to be dangerous if applied on corners, and that owing to uneven wear they will give trouble by skidding.

As laid out in the above-mentioned cars, no such trouble is likely to occur, and for corner work the car with front wheel brakes is infinitely superior to one with brakes on the rear wheels only.

The following tests were made personally by me on an Excelsior car a few months ago. Running down a 10 per cent gradient at 40 m.p.h., the driver was ordered to make a right angle turn when only 50 yds. away from the turning point. In that distance it was naturally impossible to appreciably slow the car, yet the right angle turn from

a main road into a narrow road was made without difficulty. This was repeated on several occasions. Such an experiment on a car with the ordinary transmission or rear wheel brakes would have been fatal to both car and occupants.

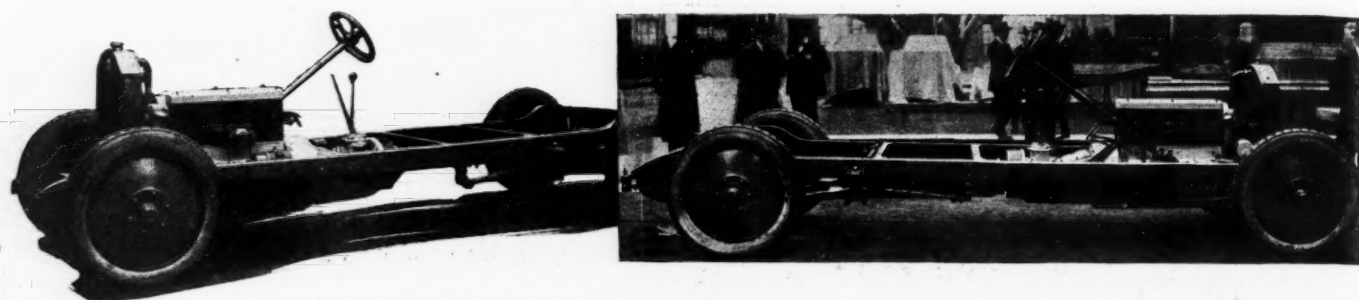
Carrying out similar tests on a Delage car, the wheels were put over at three-quarter lock, while traveling at 30 m.p.h. the brakes were applied, and at the same moment the steering wheel was abandoned. The car pulled up without any tendency to deviate from its course. This test was done under all kinds of road condition, dry, wet, and greasy, with perfectly satisfactory results. It was impossible to make the car skid by reason of an application of the brakes.

On the fast run from Paris to Nice, 621 mi., in less than 16 hr., total time, the six-cylinder Delage had its brakes adjusted once, time occupied 3 sec. This

run, which was accomplished on an absolutely standard car with full touring equipment, could not have been performed in the time without the use of front wheel brakes. On one occasion, when a blind corner was discovered at 45 m.p.h., it was possible to make

the turn in safety. With any other system of braking the driver would have certainly gone straight ahead into the fields as the easiest way out of a difficult situation, or if he had attempted that corner he undoubtedly would have overturned.

The speed with which a stop can be made on a car equipped with brakes on all four wheels is remarkable. With a car weighing 4400 lb., it is possible when running at 60 m.p.h. to pull up in 65 yd. With a car of equal weight running at the same speed equipped only with rear brakes it was impossible to stop in less than 115 yd. These are average times taken under average road conditions. The six-cylinder Delage touring model, which has a maximum speed of 72 m.p.h. can always be stopped in 85 yd. In other words, if the driver has a margin of 100 yd., he can always stop, whatever the speed of the car, with a reasonable percentage of safety.



Lancia twelve-cylinder chassis showing underslung cantilever springs

Generally when front wheel brakes are employed, there is no brake on the transmission. Delage, however, has kept his transmission brake, but the practical use of this, owing to the high efficiency of the wheel brakes, is to hold the car in a standing position. On this machine the wheel brakes are operated by the foot. Hispano-Suiza has no transmission brake, but on this car the brakes on the rear wheels can be operated by the foot in conjunction with those on the front wheels, or independently by lever. This arrangement has been made in order to have one set of brakes which will hold the car when it is in a standing position.

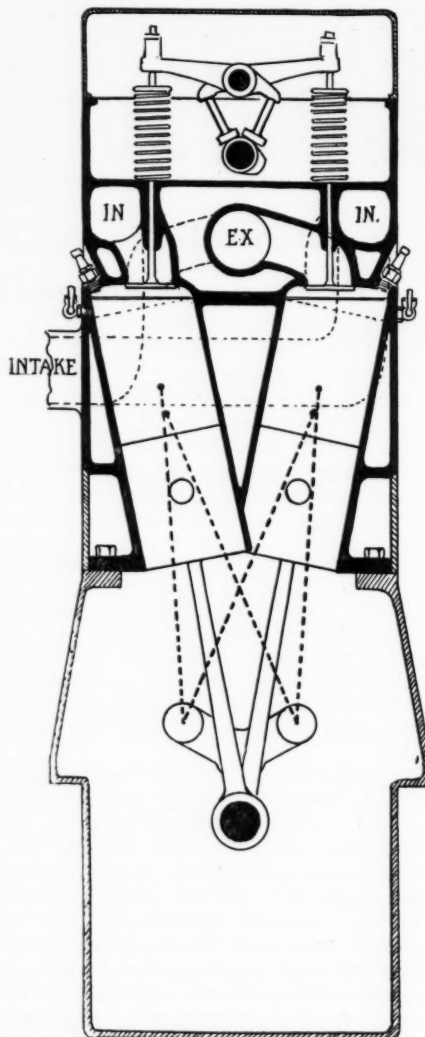
Transmission Brake Loses Ground

Apart from front wheel brakes, close attention has been given to braking systems in general. The transmission brake has lost ground with the adoption of unit construction of engine and gear box, which has decided engineers to place both sets of brakes on the rear wheels. With hardly an exception, all these brakes are internal expanding type inside ribbed drums, the two sets being placed side by side. Some makers give a greater width to the foot brake than to that operated by hand. Drum diameters are large, many of them running as high as 15 in., and in a few big cars the diameter goes as high as 20 in. Ferodo has gained considerable ground as a brake liner.

Car suspension has been given close attention, this having been forced on French manufacturers in particular by reason of the rough road surfaces in France. These conditions must not be confused with those at home. The roads are not bad as badness is understood in the United States. Even in the old war area the roads are macadamized, straight, and well laid out, but owing to heavy traffic and neglect, are so full of small holes that they inflict terrible punishment on a car when speed is attempted. These bad patches are intermittent and are apt to be struck when traveling at very high speed. Thus unless the springing is good the speed has to be as varied as the road surface. On many of the roads of France at the present time the limiting factor in speed is not the engine but the springs.

The great majority have sought improvement in the use of cantilever springs for the rear. One maker, Elizalde, also has cantilever springs in front in conjunction with semi-elliptics. All others use semi-ellip-

tics only in front. Numerically semi-elliptics for the rear are about equal to cantilevers. Both length and width of springs has been increased. There is a tendency to fit shock absorbers, the Houdaille being prominent on French cars, and there is also a rather considerable use of an inverted or damper leaf above the main leaf. At the present time the only user of the platform type of suspension is Delaunay-Belleville. Renault and Clement-Bayard have adopted transverse rear suspension for the cheap models they are producing.



This diagram is not made from actual drawings and is intended only to give the reader a general idea of internal arrangements of the Lancia engine as we understand it from Mr. Bradley's description

Lancia Produces a Twelve

A twelve-cylinder engine of unusual design, mounted in a chassis with a novel type of suspension, has been produced by the Lancia Co. This appears to be the only twelve-cylinder made in Italy, and is one of about four different makes to be built in Europe.

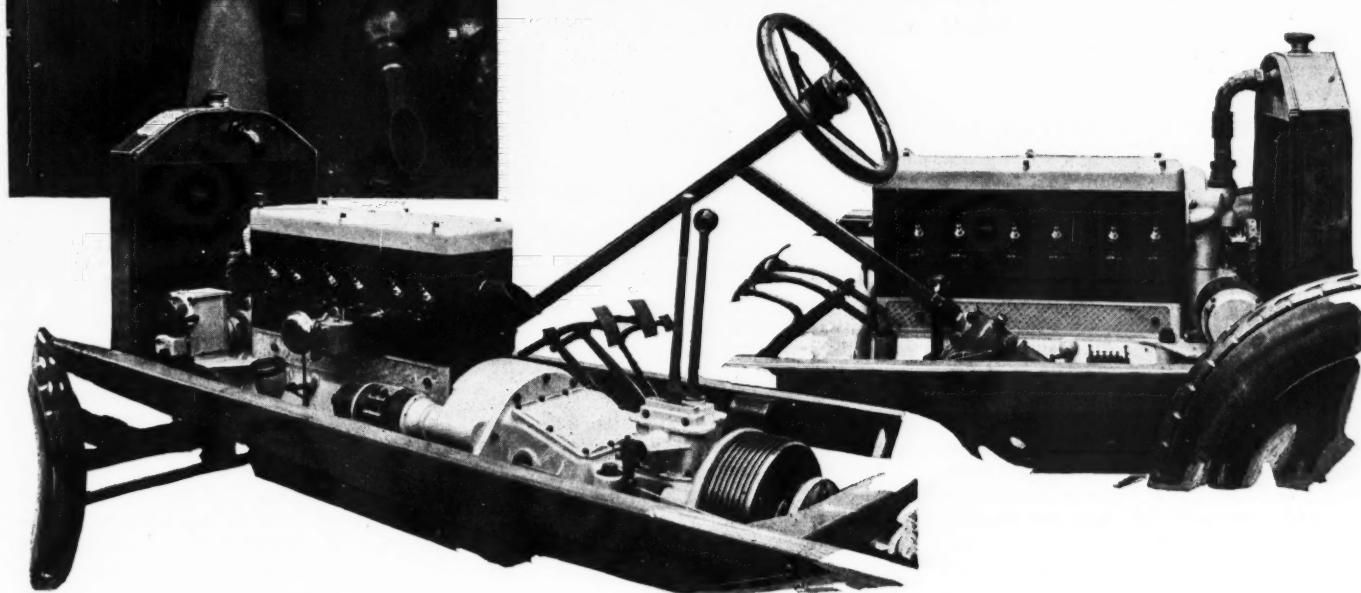
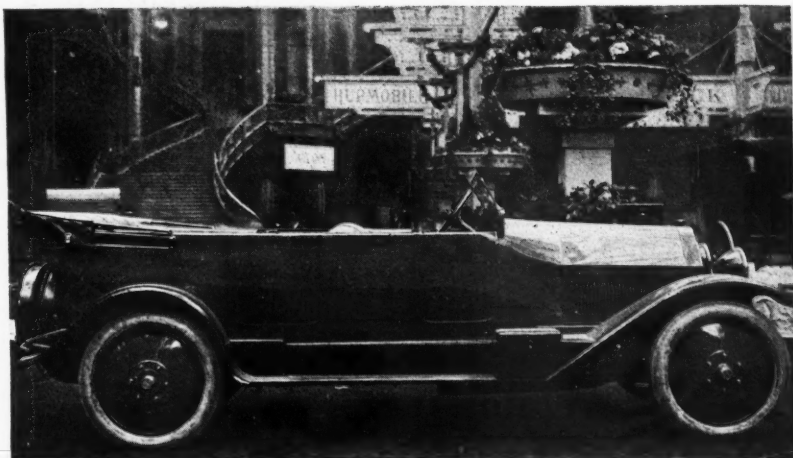
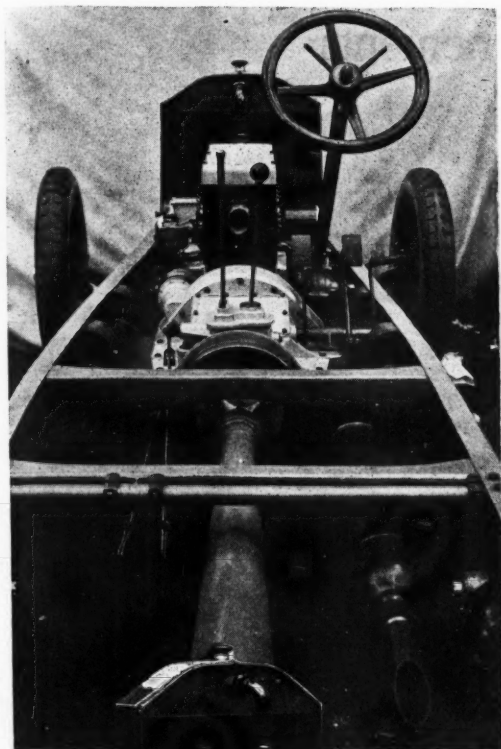
The outstanding feature of the Lancia twelve is that the cylinders are a block casting with an angle of only 22 deg. between the two rows, and one row offset in relation to the other, so that the connecting rods are side by side. It is declared that world's patents have been secured for this construction of offset cylinders and crankshaft with a small angle between the two rows of cylinders. Lancia has adopted overhead valves and camshaft with a detachable head, the whole of the overhead mechanism being enclosed.

Valves Operated by Single Camshaft

This construction gives an engine of about the same length and width as a six of equivalent bore and stroke. Even after a close external examination most persons would pronounce this engine a six with double ignition. It is an absolutely clean block casting with no moving parts visible, no apparent exhaust pipe or manifold, and no external piping. On the right-hand side there is a carbureter, and on each side there is a row of plugs inserted at an angle of about 45 deg. Across the front is a short shaft driving a Dixie magneto and an electric generator.

The Lancia cylinders are a block casting without head. As an examination of the casting reveals, the two rows of cylinders are considerably offset in relation to one another, but owing to the water jacket being common to the block this offset is not apparent externally. The base of the cylinder barrels, which would reveal this offset, is covered by an aluminum plate. This is done only in order to form a continuous line from the top to the bottom of the engine. The effect is good, for it not only hides the cylinder barrels but also the holding down bolts. There is liberal water jacket space around the cylinders.

The block casting is mounted in the usual way on an aluminum base chamber. The detachable cylinder head carries the twenty-four vertical valves, which are operated by a single camshaft and rockers. The valves are direct in the head, without cages. The cams run in individual troughs, and as



Upper left, unit power plant construction in the twelve-cylinder Lancia, showing central drive; upper right, view of Lancia twelve-cylinder model; lower left, Lancia twelve-cylinder engine, cast in one block with an included angle of 22 deg. between the cylinders; lower right, generator and ignition units are driven from a cross shaft at the forward end of the engine

the shaft is hollow and fed with oil under pressure, a constant level is maintained for both cams and rockers, independent of any inclination the engine may assume. With this construction valve springs can be changed merely on removal of the aluminum housing. To take out a valve, the head must be dismounted, as on all detachable head engines.

The method of driving the camshaft, which is carried in four bearings, follows standard lines, being by means of an enclosed vertical shaft and bevel gearing. The shaft is in two parts, with a screwdriver type connection, so that on taking off the head the upper pair of bevels and the upper portion of the shaft can be removed as a whole.

The whole of the space formed by the angle between the two rows of cylinders is occupied by the exhaust manifold, the exhaust thus being released at the rear end of the cylinder block, to which point the single exhaust pipe is

bolted up. This arrangement adds wonderfully to the clean appearance of the engine, for as the exhaust goes almost immediately under the dash, an observer might look a long time before discovering any trace of an exhaust pipe.

A dual Zenith carburetor with a single float is attached to a short intake manifold bolted to the cylinder block. All the gas passages are internal, one going to the left hand and the other to the right hand row of cylinders. Gasoline is fed to the carburetor by the vacuum system.

Cylinder dimensions are 80 by 100 mm. (3.15 by 3.942 in.). The crankshaft, which has a bearing between each pair of cylinders, is naturally special by reason of the closing up of the angle between the two rows of cylinders. Connecting rods are I-section and pistons are aluminum. The vertical shaft which operates the overhead camshaft also drives a cross shaft which commands a Dixie twelve-cylinder magneto at en-

gine speed from one end and an electric generator from the other end. Just below this cross shaft is a helical gear operating the water pump. Immediately on leaving the pump the inlet water pipe runs through the crankcase and emerges near the rear end on the right hand side, there thus being a short external length of inlet water pipe from the base chamber to the water jacket. There is a single return from the top front end of the cylinder block to the radiator.

Forced feed lubrication is employed, with the oil pump driven off the extremity of the vertical shaft. The throttle is connected to the relief pressure valve, so that when full gas is given the whole of the oil delivered by the pump goes to the bearings, none being allowed to pass through the relief valve.

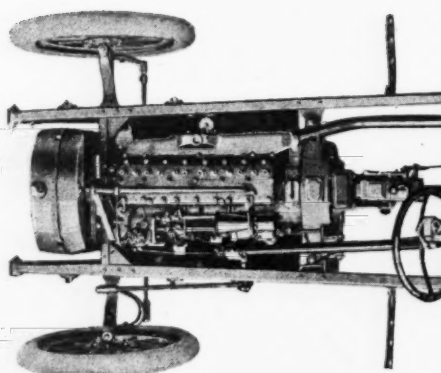
Engine on Extended Frame Webs

The Lancia engine is mounted on the extended webs of the frame members,

(Concluded on page 33)

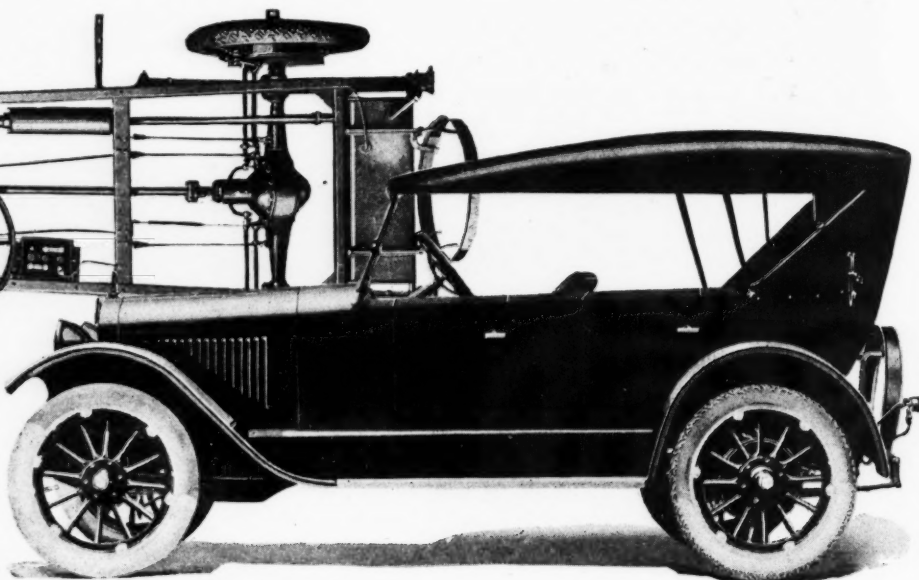
1920 Elcar Shows Refinements

Four Body Types on One Chassis with
Four- or Six-Cylinder Power Plant



Elcar six-cylinder chassis, showing mounting of 7R Continental engine

Elcar five-passenger touring car with bevel type of body and unusually wide doors



MANY improvements have been made in the Elcar series for 1920, chief among these being the adoption of a pressed-steel Salisbury rear axle and the new 7R Continental engine for the six. Two models are offered, a four and a six, having identical chassis with a wheelbase of 116 in. Open bodies are of the bevel-edge type, the features of these being deep cushions, French pleat upholstery and wide doors which open to slightly more than right angles to the body, making entrance and exit from the car very easy. Open models of the four sell for \$1395 and the six for \$1595.

The six-cylinder engine is the most recent development of Continental, having the cylinders cast in block with a detachable head. The bore is $3\frac{1}{4}$ and the

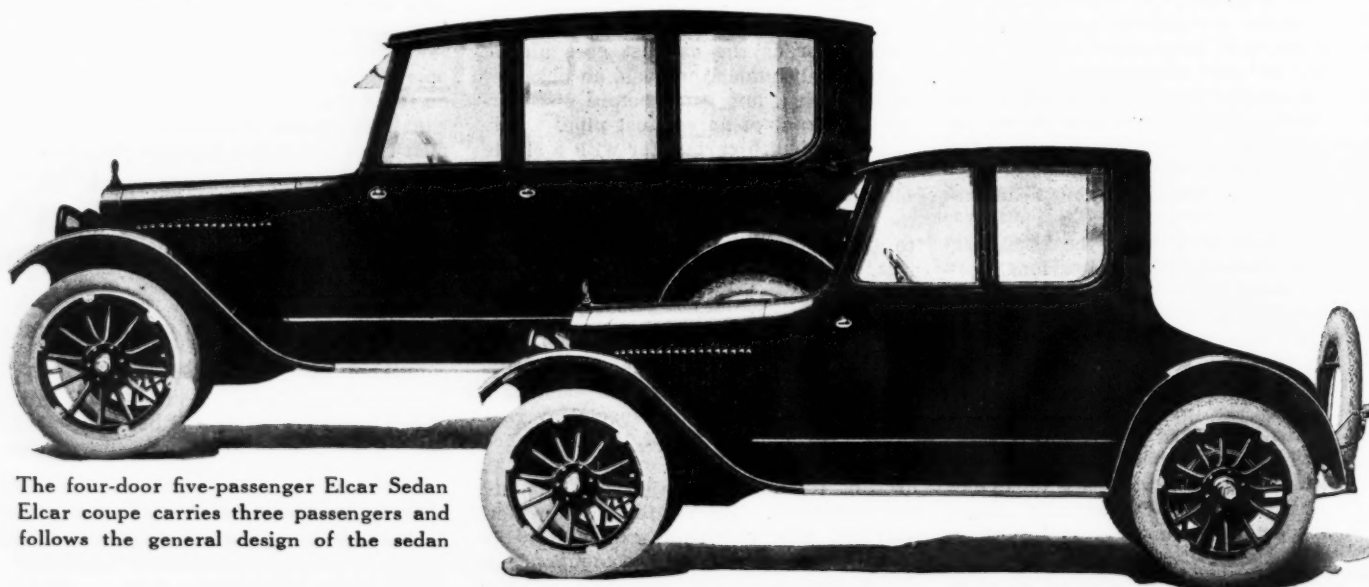
MAJOR SPECIFICATIONS OF 1920 ELCAR

Engine, six—Continental, $3\frac{1}{4} \times 4\frac{1}{2}$
Engine, four—Lycoming, $3\frac{1}{2} \times 5$
Starting, lighting and ignition—Delco
Carburetor—Stromberg
Clutch—Borg & Beck
Gearset—Muncie, three speeds
Axles—Salisbury
Tires—33 x 4
Wheelbase—116 in
Price, six, open models—\$1595
Price, four, open models—\$1395

stroke $4\frac{1}{2}$ in. It develops 55 h.p. at 2600 r.p.m., making the six-cylinder car remarkably active for its size and weight. This engine differs from last year's power plant in that it has a four-bearing crankshaft and uses pressure feed oiling. Also it gives about 15 h.p. more than the previous model.

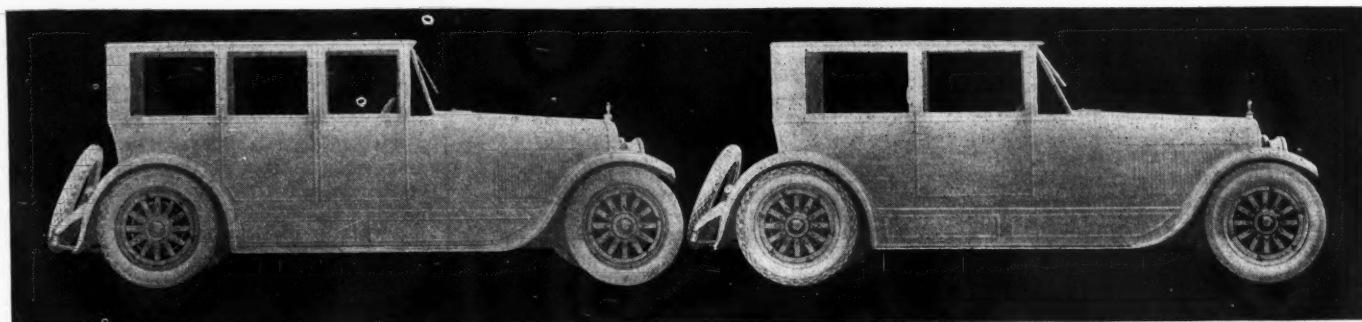
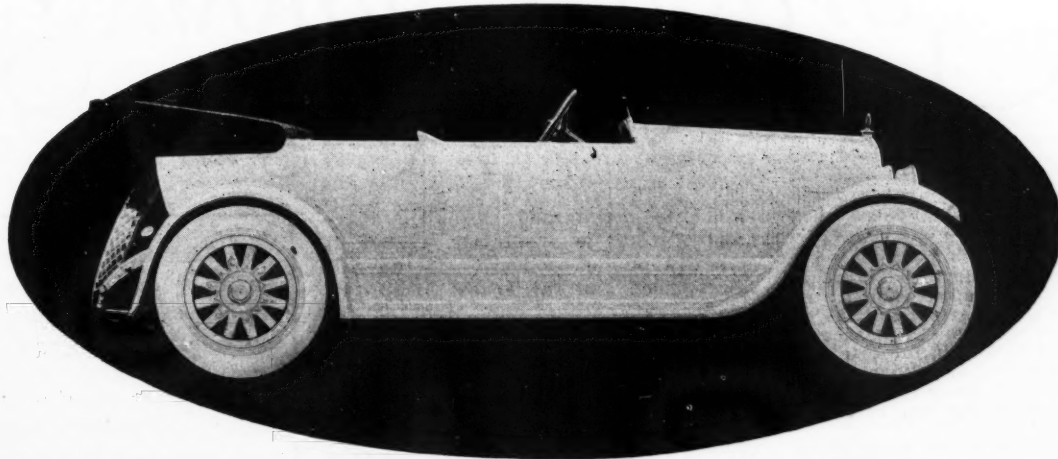
The four-cylinder model employs a Lycoming engine $3\frac{1}{2}$ by 5 in. which develops 37.5 h.p. at 2100 r.p.m. Cooling of this model is by thermo-syphon instead of the circulating pump used on the six. Lubrication is accomplished by a combination splash and pump circulation system.

Both models have Delco ignition, starting and lighting with a Stromberg plain-tube vertical carburetor. Gasoline supply is by a Stewart vacuum tank from the



The four-door five-passenger Elcar Sedan
Elcar coupe carries three passengers and follows the general design of the sedan

New Jordan Silhouette Models



These three models are the latest body products of the Cleveland firm

main fuel tank which is suspended at the rear of the chassis and has a capacity of 16½ gals.

The engine, clutch and gearset are in a unit and suspended by three points from the main frame. A Borg & Beck 10-in. dry-plate clutch is used with a Muncie three-speed gearset.

Final drive is Hotchkiss through 52 by 2½ in. rear springs which are slung under the axle. Peters universals with a tubular propeller shaft form the driving line. The Salisbury rear axle is of a new floating type of pressed-steel construction with both brakes located on the rear wheels. Bearings are Timken roller and double-row ball bearings.

Wheels are wood equipped with demountable rims for 33 by 4 tires. An enclosed worm and gear type of steering is used. Ample adjustments are provided through ball-thrust bearings. Standard equipment includes a Willard storage battery, Stewart speedometer and Boyce Motor.

Both open bodies, the five-passenger and the four-passenger sportster, have ample leg room in both the forward and rear compartments. The rear compartment has a combined foot rest and tool box, with robe rail, etc. Coach blue and maroon are the standard colors for bodies and hoods, with black fenders and splashers. Wheels are black with gold striping.

In addition to the open models there are two closed types, a three-passenger coupe and a five-passenger sedan. The four-cylinder coupe sells for \$1995 and the six for \$2195. The sedans are \$2095 and \$2295. The sedans are of the four-

door type with an angular front construction. Upholstery is wool cloth with carpets of same color effects to harmonize the interior.

SHOW INFLUENCE OF AMERICAN DESIGN

(Concluded from page 31)

there being no subframe and no underpan. The combined clutch and gear box housing is bolted to the rear face of the engine base chamber. This aluminum-casting forms two individual compartments, each with its separate detachable cover plate. The clutch is multiple disc type. There are three speeds and reverse, with the change speed lever and the hand brake lever mounted on the top of the box, consequently operated by the left hand. As on other Lancia models, the constant mesh pinions are at the rear of the box, and, with the car standing, no gears revolve.

Separate torque member has been abolished, the propeller shaft now being enclosed, and the drive is through the spherical end of the shaft housing, which is received in the corresponding female housing on the rear of the gear box.

Suspension is special and patented. It consists of a combination of cantilever and semi-elliptic, but this latter comprises only one leaf, the width of which is 4 in. at the axle end and 2.8 in. at the shackle end. The cantilever is placed directly under the frame member and also under the axle. The center and forward attachments are normal, but at the rear there is an unusual type of elastic suspension between the end of the spring

and the axle housing. This is obtained by a short, heavy steel cable with hardened spherical ends, one of which is received in a socket on the axle casing, and the other in a similar socket on the spring end. So far as the cantilever is concerned, there is free movement between the spring and the axle. The semi-elliptic, however, provides the rigid connection. This spring is not a single length, but is divided into two parts, one of which is bolted to a seating just to the rear of the axle tube, and the other to a corresponding seating ahead of the tube.

There are no spring eyes on this car. The main leaf of each spring is drilled with two or three holes and is bolted to a special type of shackle which is bushed in both a horizontal and a vertical plane and is provided with a spring for automatically taking up wear which may occur owing to lateral movement. Big wearing surfaces are obtained with this type of shackle and adequate lubrication is obtainable. In the case of the rear attachment of the front springs there are oil cups inside the hood from which oil flows to the entire shackle. When wear takes place the entire shackle can be removed and replaced by a new one without removing the springs. The old shackles can then be rebushed and are as good as new. This feature of the car is the subject of world's patents.

The advantages of the Lancia suspension are that the cantilever is free to operate as a spring only, and does not have to transmit either drive or torque. The single-leaf cantilever not only serves to anchor the axle, but it acts as a supplementary suspension.

Garage Planning

Service Station Arrangements

No. 129

FOR IDEAL REPAIR SHOP

WILL you please publish the arrangement for an ideal repair shop suited to a building with a 40 ft. front and 120 ft. long? The building has a 10 ft. entrance in front and also a 10 ft. exit in the rear.

Our equipment consists of a lathe, emery wheel and buffer, drill press, gear press, battery charging outfit for ten batteries, and a motor bench.

We also wish to have our parts stock and oil room in this building, but it is to be used exclusively for repair work.

Our main difficulty at the present time is having owners coming in the shop without interfering with the work.

Enclosed find a rough sketch of the plan of the building.—Erwin G. Sandrock, Watertown, Wisconsin.

Probably most of your difficulty from owners' interference is caused primarily by your exit passing through the shop. This practically makes your shop a pub-

trance is maintained the aisle space from A to B is absolutely wasted, it is really public property. If the exit were closed and the space all thrown into the shop, five cars could be accommodated instead of one.

No. 130

FOR A SALESROOM

WE ARE enclosing a rough sketch of a proposed building, showing location of streets and alleys. We expect to build a salesroom 54 by 115 ft. with wing 25 by 24 ft., one story, wood and concrete with a foundation for additional stories as needed.

We are contemplating handling Dodge Bros. cars and the building will be used principally for sales and general repair for a town of 3,000 population. I have a plan drawn for the building of which I have enclosed a sketch, and which will have to be built about the way the sketch shows without much change, as far as walls, par-

MOTOR AGE is receiving many inquiries or garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and inquiries are urged in asking for such plans to be sure to include the following information:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

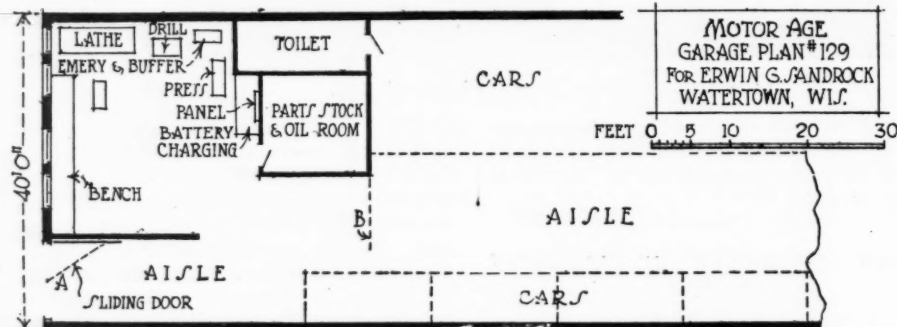
What departments are to be operated and how large it is expected they will be.

Number of acres on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.



Layout for an ideal small repair shop

lic highway and makes it impossible to keep it closed or private in any way. It is also distracting to your men to have cars going through even occasionally; although no car may be passing they are constantly on the lookout to avoid being hit by a careless driver.

Your first duty will be to enclose your shop, either partitioning off a space large enough to take your machinery and the cars "in work" as shown, or at least enclosing the machinery and a small working space large enough to disassemble engines, axles, gearsets, etc. This is evidently impossible with a center exit in the rear as there will be a space of only 14 ft. at each side, consequently the only sensible course is either to close up the door and use it only in an emergency, or move the entrance to one side leaving a good 29 ft. strip. We prefer the former course, but it may cause confusion if there are many cars turning in your narrow aisle and the latter may be the best in the end. An idea of the difference in working space of the two arrangements may be obtained from the layout. When the side en-

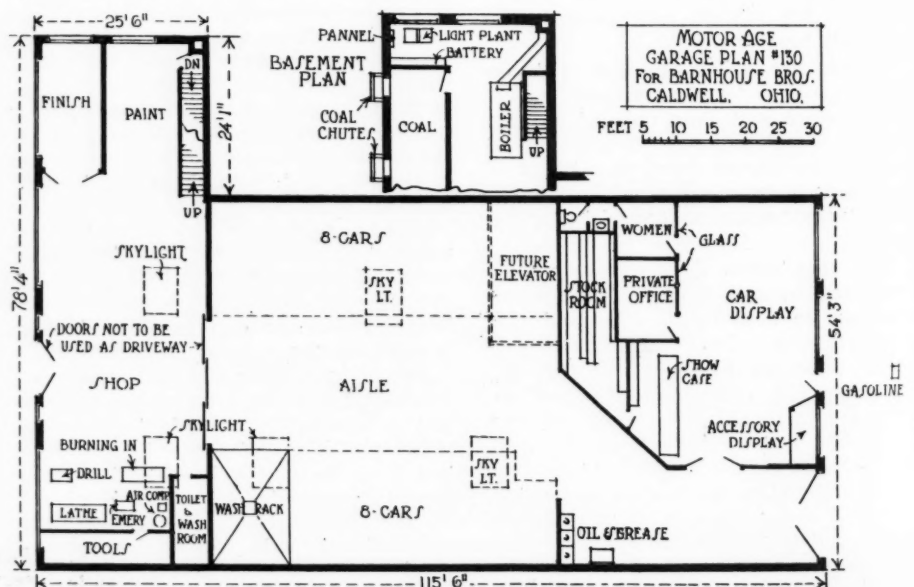
titions and openings are concerned. What I want is inside arrangements. I want a women's restroom, showroom for two cars, accessories, parts room and private office,

skylights and wood trusses with as few posts as possible.

In the shop I want room for three men to work at benches and room for three cars, burning-in stand, drill press, emery wheel, air compressor, wash rack, two paint rooms and men's toilet.

Basement for heating system and electric light plant, 20 x 24 ft.—Barnhouse Bros., Caldwell, Ohio.

In the first place, we think it is



Plan for salesroom of limited size

a mistake to build with a center entrance in a building of this width. It divides the office showroom and accessory store into spaces which are too small to be of real value. The office and accessory store would work out all right in your plan, but when you start showing cars, you need enough room to stand back and size them up or else it is better not to try.

Consequently, we have moved your entrance to the side and grouped the accessory store, office and stock back of the car display room in such a way that very little more space is used than in your plan.

In our opinion, another mistake you make in planning your exit to pass through the repair shop to the alley. You will find that with everything wide open your men will spend a good share of their time "kidding" with loafers who habitually hang around such places, besides being interfered with by owners who want to tell the men how to do their work.

Your 6 ft. grand stairway is rather unnecessary, 3 or 3½ ft. is plenty of width. We have also moved the wash rack into the storage room where it will do duty as storage space when not in use.

If you build a second story later you will want an elevator and we have shown a good location for it, both in regard to this floor and the second.

Skylights can be located in most any way to give light where it is wanted, two in the dark part of the shop and three in the garage should give a very good distribution.

No. 132

GARAGE FOR SUBSEQUENT ENLARGEMENT

ENCLOSED find three sketches of our garage plan. As building is expensive just now we are starting in with 40 x 99 ft. and intend to add 35 x 144 within a year or two.

We will handle about forty large cars a year, have a gasoline service station as a special feature, carry parts, supplies and tires enough for half the business in a town of 3,000. Our idea is to plan both sections in order to save waste when the garage is enlarged. At present we will do only service work on the cars we sell, tire repairing and devote special attention to the sales department. We will want large show windows and room for at least five cars.

Please draw us a floor plan showing both the 44 x 99 ft. section and the 35 x 144 ft. section. Elevation view from the west and south, showing either the gas pumps in place on our sketch No. 2 or No. 3. We will build with hollow tile, using a yellow and red facing brick for the west and south. What do you think about the use of an alcove effect on our accessory room?

Our force for the present will be one service man for cars, one tire repair man, one gasoline salesman and two car salesmen. When the east addition is built we will do a general garage business with storage. This will require five or six more mechanics for the shop.

As we are in need of this building at once, we will consider it a special favor to mail us the new plans at the earliest possible date.

Your department has been of special interest to us ever since its start and we are sure many dealers join in thanking you

for the fine information and help.—Hotchkiss Motor Co., Bloomfield, Iowa.

If you have read our comments on corner gasoline stations of the type shown in your No. 3 layout, you probably know what we think of them. Consequently, will not comment on them again, but will consider only the No. 2 suggestion with the filling station at the side. You have the right idea in these plans, that is, to make them to scale and we believe a combination of No. 2 with the new section shown in No. 3 would be a good proposition.

The one thing that is not good about the plan is that it gives up too much space to aisles. We, therefore, make a suggestion which will give you as much car space, but only about half the aisle space, the difference being a gain in office, stockroom and showroom space. The only real disadvantage is that it necessitates the removal of the east wall when the addition is made, but this is not as bad as it sounds, since you intend to build of hollow tile, and this material is very easy to remove, especially if the mortar isn't too rich, and can be put right back in the new wall. Another way would be to make this a frame wall with stucco outside, and then the lumber could be used again and the operation would not cost as much. It is almost impossible to plan a building of this sort so that it will need no changes when it is enlarged, but you are on the right track when you plan for the future in building for the present.

Another feature that we would change slightly is the filling station. You show the pumps inside the building and we are at a loss to know how you intend getting the hose from the pump to a car at the curb without obstructing the sidewalk. Perhaps you have some scheme, but we think the pumps had better be outside for other reasons, namely, odor, fire hazard, etc., besides the fact that they are a sloppy, messy proposition at best and will not im-

prove the appearance of your accessory department.

No. 133

FOR SMALL GARAGE

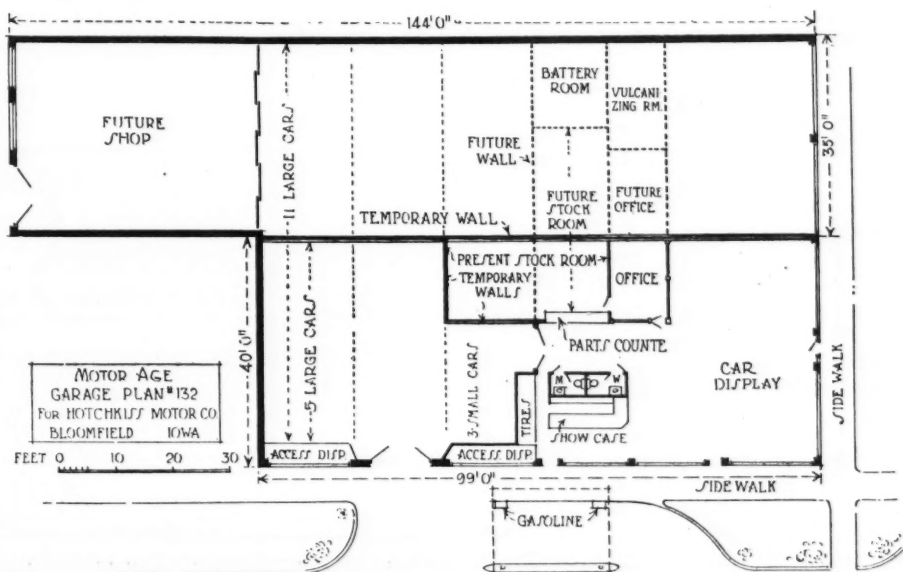
AM planning to build a garage here at Minerva, Ohio, a small town on the Lincoln Highway. There are two garages in this town but neither on the highway. I am inclosing pencil drawing of the lot which I have purchased and would thank you very much if you would help me in planning. The plan I have drawn up shows the garage set back from the street in order that people might drive up to get gas away from traffic. What do you think of this?

The building I have shown is small. I would like to store a total of about twelve cars. I put the entrance at one side on account of gas pump, but like the center entrance better, if I could have it. The building will be made of building tile 6 in. x 8 in. x 12 in. These tiles are manufactured here and I can get them for \$48.00 per thousand. I would like to put a flat roof on the building but do not want any posts if I can help it.

Will you be kind enough to send me a pencil sketch showing the size, height and plan of a garage which you would recommend for a lot like this, together with some kind of roof truss for a flat-roofed building requiring the least possible steel? I prefer all-wood trusses if they can be made. Steel is hard to get down here.—A. W. Yeagley, Minerva, Ohio.

Your garage as you have it planned will not accommodate twelve cars unless they are packed in without regard to getting them out again. As near as we can tell from your plan, you figure 40x50 ft. for the whole building and in that proportion even a Chevrolet car could not be squeezed into your display room with a shoe horn; or if it could be squeezed in, one would have hard work getting in to see it. A showroom should be at least large enough to show off a car and not have all the characteristics of a packing case.

MOTOR AGE believes it does not pay to try to crowd all the departments of a garage into a space that is far too small. The storage space we show is 50 by 50 ft. and would hold fourteen cars instead of twelve if there were no



front door, or if the front door were centered and the side door closed. A center entrance would interfere with your filling station as you say, but it would do more damage to the arrangement of your office and sales space, cutting it into two small portions neither of which would be large enough to be good for much.

We have cut down the width of space given to the filling station in order to bring the front of the building up closer to the street. There are many kinds of wood trusses which are suitable for your needs, such as the Queen Post truss which is simply a heavy beam, solid or built up, with two posts under it supported on a tie rod attached to each end of the beams. The only all-wood truss which we think of is the lattice truss with the round top, manufactured and patented by a Chicago concern. There is no reason why this truss could not be made with a flat top and curved or pointed bottom member or flat both top and bottom. The garage department has shown diagrams of all of these styles recently. The truss depth should be about 6 ft. or one eighth of its span.

The filling station idea works out better with the lot you have than in most cases. As a rule, put the soft pedal on such arrangements as they kill the front and most valuable part of the building. Situated as you are this may be the largest part of your business and in that case might well have a preferential location.

Public Garage Heating System

ILL you please furnish us information as to different heating systems which are installed in public garages? We prefer information on the hot air system, if possible.—St. Clair Motor Car Co., Belleville, Illinois.

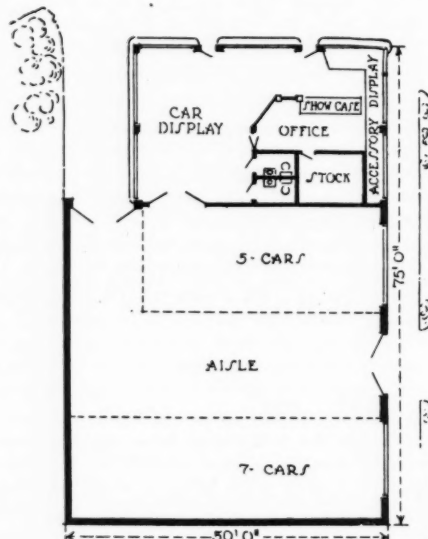
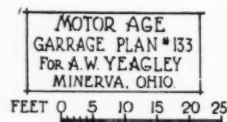
We do not know just what you have in mind when you ask for information. A book could easily be written on this subject. MOTOR AGE issue of June 12, had an article touching all the phases of garage heating and if you can dig out a copy of this issue you may find what you want.

In some states and cities of others, only steam or hot water may be used for heating garages and entrance to furnace rooms must be from outside the building.

A hot air system is the most economical to install and in the return system where air is circulated through the furnace continually, it is the cheapest to operate.

Almost any good furnace will do and the man who sells it will be able to give you its capacity in cubic feet of air heated. One square foot of grate surface will heat 22,000 cu. ft. of air 100° F per hour, based on burning 4 lbs. of coal per hour, per square foot of grate when the available heating value of coal is 10,000 B. T. U. per pound.

If you wish to do a careful job of



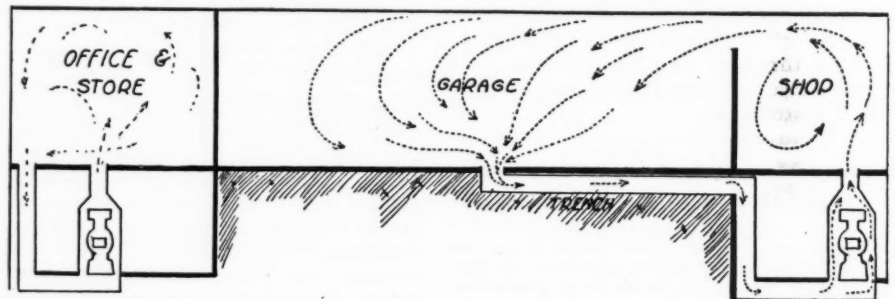
Garage on extremely small plot.

figuring you must get tables giving the amount of heat radiated by your walls, ceiling, windows, etc., in B. T. U. per sq. ft. per hour at the lowest temperature you are liable to experience in your latitude. Then the supplying of this loss will determine the grate area.

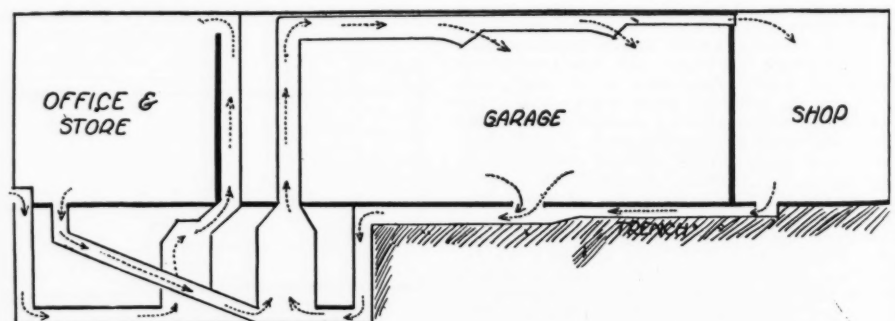
MAKING RETREADS FIT

A new method of tire retreading has recently sprung into popularity in which a specially made casing containing tread, sidewalls and fabric is cemented over and completely incloses the old tire after the latter has been buffed smooth. Inasmuch as this retread casing is a constant size it sometimes happens that the tire it is to cover is too small. In this case it is a loose fit in the retread casing. Particularly is this true if the old casing had to be stripped entirely of its retread rubber because same was loose. Naturally when a tire is too small but not small enough to take the next smaller size retread casing it is obviously necessary to build up the old tire until it fits.

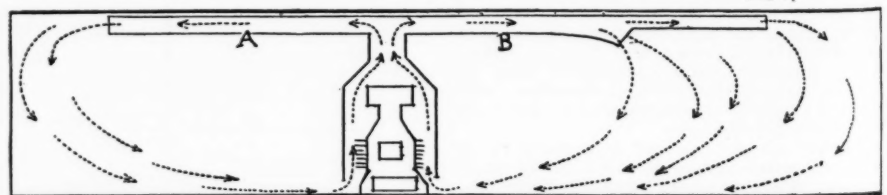
To vulcanize new stock in place is expensive and must be cured all around in the vulcanizer. A simpler but perfectly satisfactory method is to cement one or two layers of an old inner tube with cold cure cement.



The pipeless furnace is the most inexpensive of all heating systems



A few pipes for the distribution of the heat are a great advantage in giving a more even temperature and more accelerated circulation



Where no basement is available a scheme of this kind is as good as can be had. Put the distributing pipes A and B as high as possible to take advantage of the height of the air column to speed up circulation

The Accessory Corner

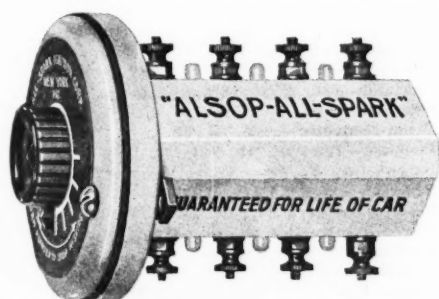
New Fitments for the Car

BU-NITE LIGHT WEIGHT PISTON

THE Bu-Nite piston made by the Butler Mfg. Company, Indianapolis, Ind., is a light weight piston, being made from a special bearing metal. The chief advantage of this piston is that it overcomes oiling difficulties. This is claimed by the manufacturer. The reason that Mr. Butler, president of the company, can legitimately make this claim is easily seen when it is realized that this aluminum alloy piston is fitted with a clearance of from .002 to .003 in. This is a radical departure from the standard method of fitting aluminum alloy pistons. A split in the skirt of the piston which is cut on a helix takes care of any excessive expansion of the metal and thus overcomes any piston-seizing possibility. During the several years that this piston has been on the market it has given much satisfaction and is now sold on the guarantee that it will be satisfactory.

HORN BUTTON FOR FORD

Here is a handy little accessory the Ford owner will be delighted to use on his Ford. It places the horn button on top of the steering post instead of on the side of the door. The steering column position is very handy, as every one knows. This switch is easily installed. The list price is \$.60. It is made by the Handy Products Co., Cleveland, Ohio.



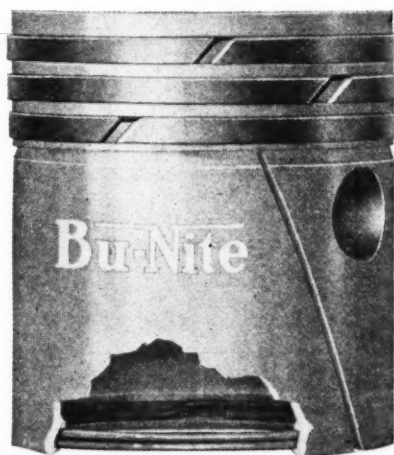
All-Spark ignition current intensifier



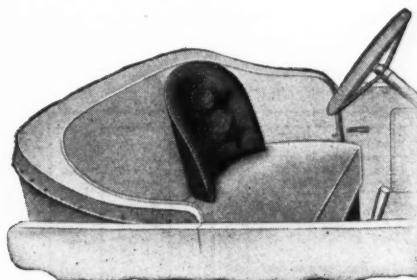
"Handy" horn button for Fords

ALSOP-ALL-SPARK

The Alsop-All-Spark is an ignition unit which performs the functions of an intensifier. The device is attached to the dashboard of the car and the high tension leads connected to it from the distributor and from the ignition unit to the spark plugs. Repeated tests made by prominent authorities have proven that this ignition unit does intensify the spark materially. The maker claims that for engines having the oil pumping difficulty this device has no equal, for a spark can be forced across the spark plug terminals no matter how badly they be coated with oil. This ignition unit is made by the All-Spark Ignition Co., 13 Water Street, New York. Its list price for the 4-cylinder model is \$7.50.



Bu-Nite tight fitting aluminum alloy piston



Seat cushion to make driving comfortable

DRIVER SEAT CUSHION

Very often a person buying a car does not purchase it because the dimensions of the car conforms to his physical stat-

ure but because there exists a definite limit to the size of the purchaser's pocket-book. To help the little men who are forced to ride in a big car and make their driving easier, the Du Pont Company has brought out a seat cushion which is placed in the driver's seat. The illustration shows the position which is occupied by the cushion when in use.

THE AUTO SPARK LITE

The Auto Spark Lite is a cigar lighter which to the motorist looking for unusual accessories is quite a novel device. Its operation is simply that of igniting a gasoline saturated wick. The ignition of the wick is obtained by inserting the point of the lighter between the terminal points upon which a spark from the high tension of the electric system of the car lights the inflammable wick. The whole device is mounted upon the dash board and because of its construction harmonizes with other equipment, the instrument clocks, etc.

FORD VALVE SPRING REMOVER

This is a special tool to remove the valve springs of the Ford engine. It is made of pressed steel and in operation it is just like a pair of pliers. It automatically locks itself when applied to the spring, thus allowing the operator the free use of his hands to remove the pin and take out the valves. It is made by the Only Grease Gun Company, Jefferson, Iowa.



Auto-Lite cigar lighter operated from ignition circuit

Motor Age Weekly Wiring Chart No. 53

(Corrected)

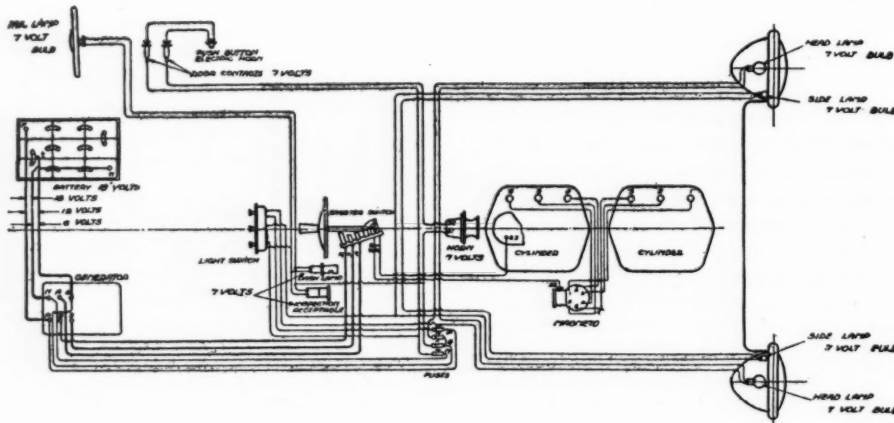
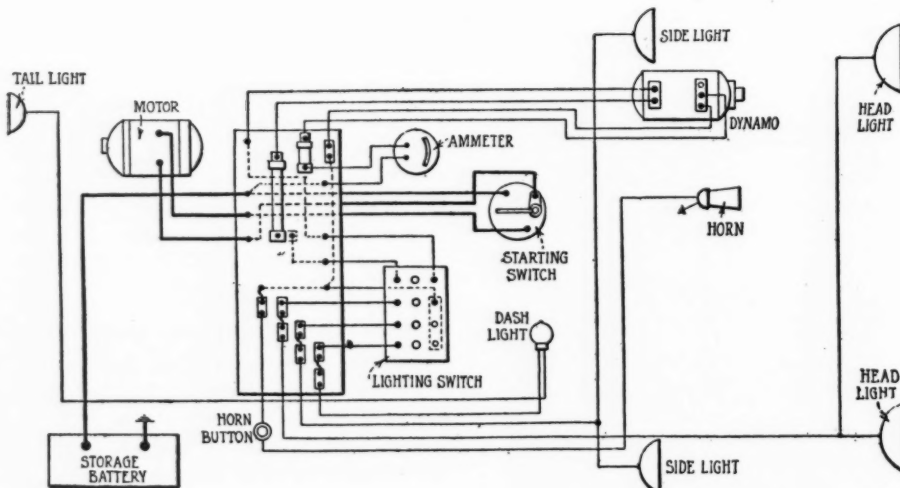
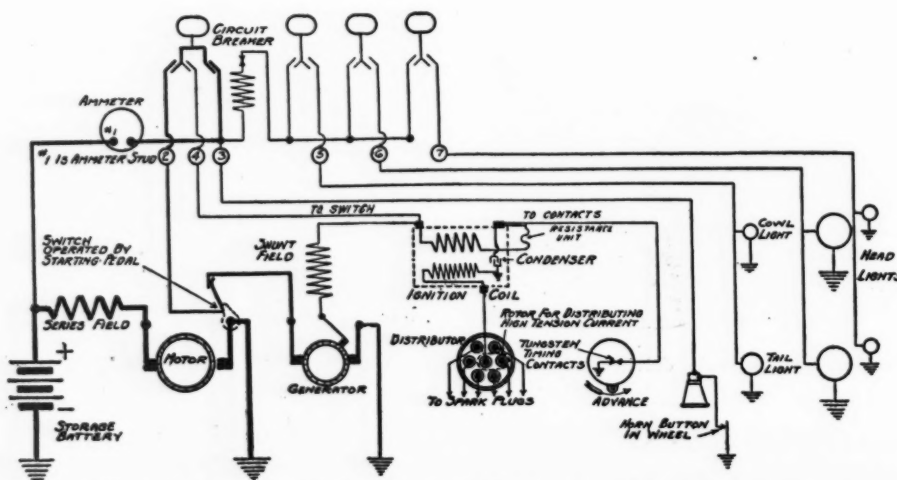


Diagram of connections on Entz system Chalmers Master-Six, 1916



Rushmore starting and lighting system on the 1914 Mercer 35



Connections for 6-40 1918 and 1919 Auburn, using Delco system

THIS WEEK

1916 Chalmers
1914 Mercer
1919 Auburn

Abbott—March 27, '19
Alco—April 24, '19
Alter—Nov. 4, '18
Apperson—March 6, '19
Briscoe—Oct. 16, '19
Buick—Nov. 21, '18; April 3, '19; Oct. 23, '19
Cadillac—Dec. 19, '18
Cartecar—May 1, '19
Chalmers—Feb. 20, '19; March 27, '19
Chandler—April 3, '19
Chevrolet—Nov. 28, '18; March 27, '19
Cole—Jan. 23, '19; June 26, '19
Crow-Elkhart—June 26, '19
Davis—May 8, '19
Detroit—March 6, '19
Dodge—Dec. 12, '19
Dort—March 13, '19
Elgin—Feb. 27, '19
Empire—March 18, '18; Oct. 30, '19
Essex—Oct. 23, '19
Ford—Jan. 30, '19; Feb. 6, '19; May 15, 22, '19
Franklin—June 19, '19
Grant—Feb. 28, '19; March 27, '19
Haynes—Oct. 9, '19
Henderson—April 3, '19
Hudson—Dec. 5, '18; May 1, '19
Hupmobile—Feb. 13, '19; Oct. 16, '19
Cutting—Nov. 16, '19
Keeton—Nov. 6, '19
King—July 3, '19
Krit—Feb. 6, '19
Lexington—April 24, '19
Little—March 20, '19
Locomobile—Jan. 23, '19; April 17, '19
Maxwell—Jan. 16, '19; Aug. 14, '19
Marion—March 6-20, '19
Mercer—Jan. 23, '19; Aug. 28, '19
Michigan—March 20, '19
Mitchell—Jan. 9, '19
Monroe—Oct. 30, '19
Murray—May 1, '19
National—June 19, '19
Oakland—Jan. 2, '19; Oct. 16, '18
Overland—Nov. 7-14, '18
Owen-Magneto—Sept. 8, '19
Packard—June 19, '19; July 31, '19
Paige—July 3, '19
Paterson—July 9, '19
Paterson—March 20, '19; June 20, '19
Pierce-Arrow—Oct. 2, '19
Premier—April 10, '19
Pullman—April 10, '19
Regal—Feb. 6, '19; April 10, '19
Reo—Feb. 27, '19; Aug. 31, '19; Oct. 9, '19; Nov. 13, '19
Saxon—April 17, '19
Scripps-Booth—Dec. 26, '19
Simplex—April 17, '19
Stanley—June 20, '19
Stearns-Knight—April 24, '19
Studebaker—Dec. 26, '19
Stutz—Jan. 23, '19
Velle—April 24, '19; Sept. 25, '19
Special Systems for Fords—May 15-22, '19
General Battery Charging—May 29, '19; Sept. 25, '19
General Magneto Diagram—June 5, '19
Internal Connections—Jul 10-17-24, '19

The Readers' Clearing House

Questions and Answers

Engines

NOISE IN BUICK AXLE

Q—When a Buick D-4-35 is going about 20 m.p.h. there is a slight noise in the differential. Is this noise caused by the wear that has taken place in both the thrust bearings and pinion shaft bearings after 5500 miles of running? How can this be stopped?

2—When standing on the left side of car and looking through the left rear wheel at the differential which way are the adjusting collars turned, clockwise or counter-clockwise in order to bring the ring gear closer to the pinion?

3—Can the play in the pinion shaft bearing be taken up or can there be no wear in this place after 5500 miles of use?

4—Publish view of an aviation engine whose cylinders turn instead of the crankshaft.—Daniel KeKok, Hospers, Iowa.

1—Look over the axle housing to be sure there is nothing loose, that the center has not sagged and thus put it out of alignment. Without knowing the nature of the noise it is impossible to diagnose the case, but evidently the rear system will stand an inspection. If nothing is the trouble you will have the satisfaction of knowing all is well; if there is trouble you will have the consolation of putting it in shape. It is probable the relation between the pinion and the ring

Conducted by Roy E. Berg

THIS department is conducted to assist dealers, service stations, garagemen and their mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Motor Age reserves the right to answer the query by personal letter or through these columns.

gear needs attention and adjustment, although there is always a possibility of something else. If there seems to be backlash, then it may be the pinion key is worn or that the gears need be brought together slightly. There is the possibility that one or more of the bearings that carry the differential or support the pinion end of the drive shaft need replace-

ment in order to prevent these parts from being out of line.

2—In the position mentioned you would turn the left hand adjustment nut to your right to bring the ring gear closer to the pinion; that is, clockwise. The other adjustment—the one on the right side of the axle—will not need be touched in all probability.

3—If the pinion shaft bearing has play it will call for a new bearing. The thrust bearing back of the pinion, however, can be adjusted and it is the movement of the collar against this that causes the pinion adjustment. It is important that the pinion bearing be true, else the gears cannot mesh properly and in time damage will be caused not only to the pinion but to the face of the ring gear.

4—The Gnome engine is shown in Figs. 1 and 2.

A VARIED LIST OF QUESTIONS

Q—What is the volume of the combustion chamber of a Dodge cylinder at the

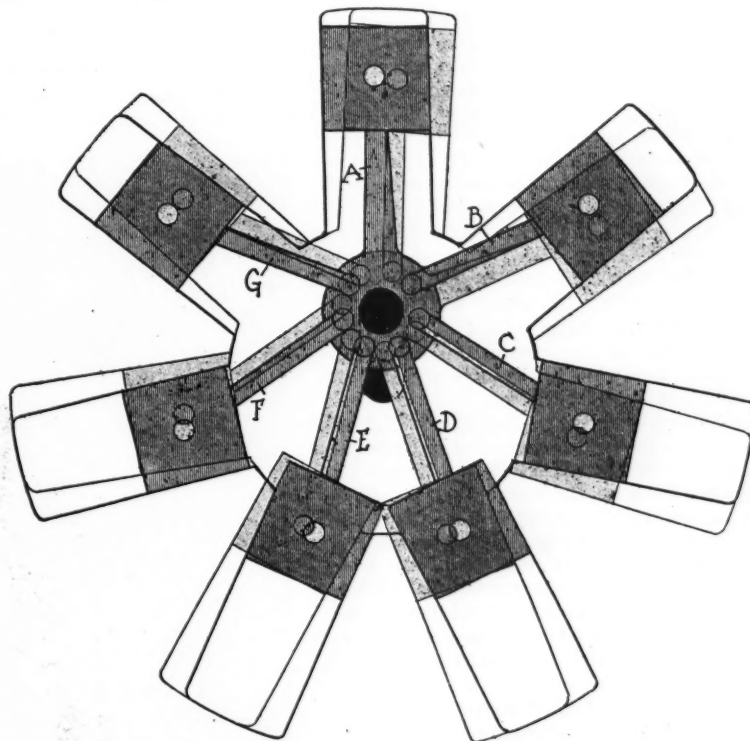
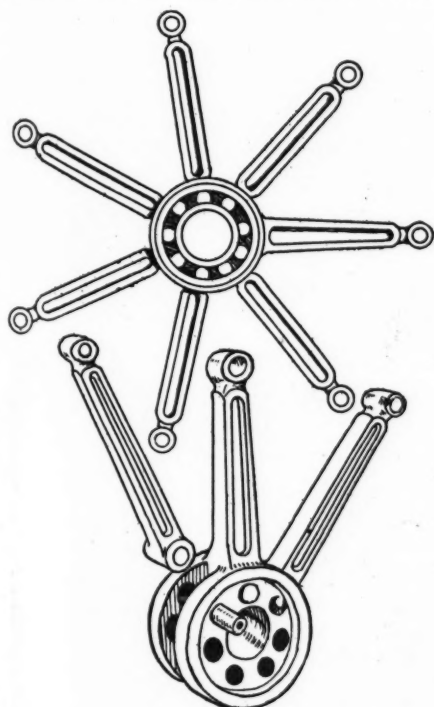


Fig. 1—To the left are the connecting rods of a Gnome seven-cylinder revolving engine. Just below is the rod retainer coupling through which the pins are inserted to hold the lower end of the rod. This retainer fits over the stationary crankshaft shown immediately below and revolves on the crank pin. Above, a phantom view of the cylinders and rods assembled shown in two different positions. The rods A, B, C, etc., above, give the pistons a reciprocating motion by revolving about the offset center.



bottom dead center? Top dead center? Average? Compression at time of spark?

2—Same questions about a late Buick four.

3—Why does the valve-in-head engine not get more mileage per gallon of gas than a T-head of approximately same size?

4—What is the S. A. E. horsepower of the Flanders?

5—The rear end on a Flanders 20 is too badly worn to repair. What assembly would you advise putting in, as the engine is still good? Would like to use same wheels or of about same size.

6—Why do not the German airplane engines have the power of the Allied engines?

7—After Dodge bearings have been taken up there is a sound at regular intervals at slow speed, which disappears at high speed. Is it a wristpin or piston slap or spark knock? It is not noticeable on a pull. The magneto and pump shaft gear on the car is slightly loose on the shaft. The knock seems to be up toward the front of the engine. The sound is very pronounced when listening under fender. What is the cause?—R. Johnson, Kansas City, Mo.

1—The question is not exactly clear because the second part rather changes the meaning. If you mean the actual volume in the combustion chamber, that is, that portion above the piston when at top dead center, the information is not available and probably none but the engineer who designed an engine would have it. The piston displacement of the Dodge is 212.3 cu. in., the bore being $3\frac{3}{8}$ in. and the stroke $4\frac{1}{2}$ in. Therefore, the volume, when the piston is at bottom dead center, would be 212.3 cu. in., plus the volume of the combustion chamber; it would be 106.15 in the center of the stroke, plus the volume in the combustion chamber and at the top of the stroke it would be nothing except the combustion chamber volume. The compression at the time of the explosion will depend upon the normal compression. It will rise about four times at the time of propagation.

2—The Buick is $3\frac{3}{8}$ by $4\frac{3}{4}$ in. and this gives 170 cu. in., which would be the volume at the bottom dead center, plus the volume of the combustion chamber proper. Likewise the volume at the half way point would be 85 cu. in.

3—Theoretically, because the valves are in the top of the combustion chamber and the propagation of the gases is quicker because the flame does not have so far to travel. Besides this, there are no pockets for the gas to lodge, as in a T-head or L-head engine. Thus there is, it is claimed, no unburned gas, consequently greater power for a given quantity and of course this means the use of less to accomplish a certain amount of work.

4—The size of the engine is $3\frac{3}{8}$ in. bore by 4, $3\frac{3}{4}$ in. stroke, giving 134 cu. in. piston displacement or 20.96 h.p. S.A.E. rating.

5—We do not believe it will pay to try fitting a new type rear axle and all that goes with it. You can buy a whole new outfit for this model from the Studebaker Corp. or one of the wrecking companies in Kansas City at a saving of considerable money. If you are at all handy with tools you can take down and apart the axle and reassemble them. At the

To assist readers in obtaining as a unit all information on a certain subject, MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

ENGINES

Daniel Kekok.....	Hospers, Ia.
R. Johnson.....	Kansas City, Mo.
Render.....	Hollywood, Calif.
H. T. Dimick.....	Shreveport, La.
J. J. Schneide.....	Springfield, Ill.
A. E. Drason.....	Rapid City, S. Dak.
John S. Nelson.....	Harvey, Ill.
Jack Tidd.....	Juliana St. Garage
O. Ulman.....	San Francisco, Calif.
W. M. James.....	Milwaukee, Wis.
Gridley Garage.....	Gridley, Kans.
Harold E. Riester.....	Detroit, Mich.
W. Neal Walden.....	Evansville, Ind.
Lewis R. Salsbury.....	Billings, Mont.
J. J. Schneider.....	Springfield, Ill.

THE ELECTRIC SYSTEM

J. E. Newman.....	Bloomington, Ind.
Herbert E. Beck.....	Norfolk, Va.
John Renken.....	Pleasant Plains, Ill.
Dale L. Fritcher.....	Nashua, Ia.

REBUILDING

Raymond J. Stillman.....	Waterloo, Ia.
C. S. Blair.....	Dinton, Kans.
A. Render.....	Williston, N. D.
J. M. Bridges.....	Jackson, Miss.
S. W. Leseke.....	Hartford, Conn.
D. C. Galvin.....	Youngstown, Ohio
R. D. Conard.....	LaMolle, Ill.
R. C. McCulloch.....	Okmulgee, Okla.
Alphons Thasky.....	Chicago

MISCELLANEOUS

Earl H. Wiget.....	Portsmouth, Ohio
W. A. Louis.....	Hamilton, Ohio

worst you can get some mechanic to assist you. Try the wrecking places for parts and also the Studebaker agency.

6—"Pep," as you term it, is not measured in terms of sound, so would mean little. Some engines sound vicious and others are rather modest, yet performance would not necessarily bear out the sounds.

7—Play in the pump gears or coupling will cause a noise similar to the one described. This can be tested out by holding a heavy stick against the pump shaft while the engine is running. This acts as a brake. If the noise is there while the stick is used as a brake, you will know this is not causing the trouble. There is a likelihood your crankshaft has not been correctly lined up and that it is permitted to whip. If so, it may break under strain or at least will wear itself out of true. A loose wristpin will indicate itself on a pull and a piston slap will be present at all times. A spark knock will show when the engine is pulling and the speed of the car has dropped. It is not likely this if the knock does not manifest itself on a pull.

TROUBLE WITH THE VALVES

Q—In the Northway engine used in a Jackson 46, $4\frac{1}{2}$ by $5\frac{1}{4}$ in., the exhaust valves give trouble by pitting and accumulating carbon. Changing the grade of cylinder oil and changing the carbureter adjustments and the valve push-rod clearances have had no effect. Would a new set of exhaust valves of tungsten steel remedy this trouble? What other means can you suggest?

2—The pistons are quite heavy but have been balanced, together with the connecting rods, so that all weigh exactly alike. The vibration of the whole front end of the car is excessive, particularly at 25 to



Fig. 2—Photograph of a 5-cylinder Gnome engine.

27 m.p.h. Will the installation of a new set of the late type of light-weight pistons eliminate this vibration, assuming that bearings, engine bolts, etc., are tight and the pistons and cylinders are ground to .003 in fit?—Reader, Hollywood, Cal.

1—Material in the valves can have nothing to do with the accumulation of carbon; that is a matter of lubrication and carburetion. We would advise checking up on the valve timing, as possibly this opening is wrong and this would tend to permit an accumulation of carbon, which will make pitted valves and valve seats. Likewise, the ignition may not be correct. Tungsten valves, however, will give satisfaction and will, undoubtedly, stand more heat than ordinary valves. If you change one set, make the job complete and put in new ones all around.

2—Every engine has a point of vibration and usually it is around the 25 m.p.h. mark, although it will generally disappear after the speed of the car has increased.

Go over the engine bolts again, and also the nuts that anchor the cylinders to the crankcase. It is frequently the case that they are loose and will cause vibration. If the crankcase is slightly bent this will permit it to whip and be the means of causing vibration. This is well worth looking into.

The lighter pistons will naturally eliminate at least some of the vibration. They should be carefully balanced and well fitted, however. You can have light pistons made by Harry Miller, of Los Angeles. It will be necessary to give the lighter pistons more clearance than those made from cast iron, but not knowing the make or pattern we cannot advise exactly how much would be safe.

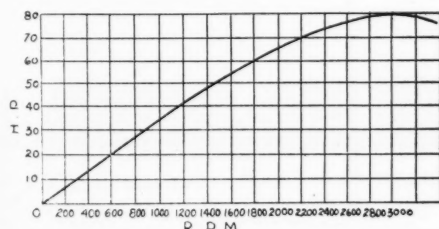


Fig. 3—Power curve of the 1919 National Highway 12

THIS SIX PERFORMS WELL

Q—Where a light six was run for 90 miles continuously, through swamp, gumbo and red clay hill roads after a rain, so that it was necessary to run for nearly a mile on low and second continuously, pull out of mud holes and labor up hills where the traction was bad, would 2 quarts of water put in the radiator en route indicate that the engine heated too much, or would that be pretty good performance, everything considered? On a return trip of over 100 miles, a quart of oil was put in the crankcase, none being necessary on the going trip. The engine was not stopped, except where it stalled in pulling out of a bad bog and for a few minutes while adding water to radiator. Entire trip consumed 11 hours, six going and five returning. Gasoline mileage averaged 13.5 even with much use of low and second gears on boggy roads. How was this for general per-

formance and car condition? No repair work was done on car at the end of the trip.

2—Publish power curve of Hupmobile R.

3—Publish power curve of National 12-cylinder engine.

4—Of the Olds \$45.

5—How long should the cylinders wear on a car of medium price, under hard usage, provided the oil is drained each thousand miles, good oil used, and the engine given attention when needed?

6—If cylinders are rebored so as to increase their size 1-16 in. in diameter, will it make the increase of power at lower speeds or on a pull?

7—Will giving an exhaust manifold several coats of enamel tend to reduce radiation and thereby hold the heat longer in cold weather, giving better fuel conditions, where the exhaust is used to heat the intake gases? If so, what sort of enamel or paint is best?—H. T. Dimick, Shreveport, La.

1—This can be characterized as not only a good but an exceptional performance.

2—No curve is available for this car.

3—See Fig. 3.

4—See Fig. 4.

5—Three to five years.

6—The increase in power will be very little, despite the fact that the displacement is increased somewhat. Not knowing the cylinder sizes the amount of increased displacement cannot be told. Any increase in power will be shown under all working conditions. It must be remembered that increasing the cylinder and piston sizes does not increase the manifolds to permit more gas to enter and it does not change the valve setting or timing.

7—We know of nothing that can be applied to an exhaust manifold that will withstand the heat except asbestos. This can be wrapped around the manifold and held there by metal straps. You should not need it in Louisiana.

OVERLAND CLICKS ON PULL

Q—What causes a peculiar click or sound in cylinders of an Overland 81 when pulling up a hill with a lean mixture? Does it indicate something is wrong with the engine?

2—The water in the engine froze last winter and slightly cracked the outside so a slight drip could be noticed. A little radiator compound stopped it but the engine uses more water than others do (not extremely so—only about 1/2 gal. every 3 or 4 days). Recently I noticed oil in the water, and when the engine was cranked slowly the compression could be heard to escape in the water.—J. J. Schneider, Springfield, Ill.

1—On a hard pull naturally an engine requires more power than when run-

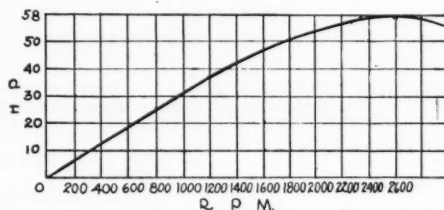


Fig. 4—Illustration of the power characteristics of the 8-cylinder Oldsmobile 1919 model

ning on a level, especially with its momentum constantly decreasing. It is perfectly natural that a slight clinking noise should be heard under the circumstances. The light mixture forms a slow burning charge and this would tend to heat the engine if the hard pull were for any distance and the lean mixture used. It would be well to have a hand adjustment, if you are in a hilly country, so you can enrich the mixture a little when a hill is to be negotiated.

2—If the crack is only on the outside of the water jacket no harm can come from it, but if on the inside it will cause trouble. Water may leak into the combustion chamber and if the engine is started with this full something will have to give way. The amount of water used is not excessive, although the extent and nature of the driving, to say nothing of road conditions, will have an important bearing on the matter. Let the car stand over night and in the morning open the priming cock of the suspected cylinder and see if any moisture is blown out when you turn the engine over by the hand crank. If there is water there it will cause a short at the plug and misfiring until the engine has worked off all the moisture. It will do no harm to use the engine, but you will have to be careful to open the priming cock at least every morning before starting the engine. If there is a leak here, through a slight cylinder wall crack, it can be fixed by welding or by another process practiced by a number of concerns whose advertisements will be found in MOTOR AGE.

COMPRESSION PRESSURE EXPLAINED

Q—Referring to a gas engine with 40 lb. pressure to the square inch, what is meant by the compression? Does it refer to the pressure or the act of holding the power exploded? For instance, take two cylinders with 40 lb. to the inch pressure, does it not take the same amount of power from the other in making this pressure? If the same amount of gas be confined in a chamber without being pushed up by the piston and exploded, would it not make as much power? Is it not a fact that this pressure is caused by the preparation of the piston to kick the main shaft over, and not really necessary to produce power?—A. E. Drason, Rapid City, S. Dak.

When the piston is at the end of its suction stroke, for instance, there is no pressure, except the approximate atmospheric pressure 15 lbs.; in fact, at this point there is a slight vacuum. For the sake of argument, however, there is no pressure. As the piston proceeds on the compression stroke the pressure, or compression, increases, until at the end of this stroke it is at its maximum. There would naturally be some loss due to leakage past the rings, possibly past the threads of the spark plug and also by the valves, all this being determined by the condition of these parts and their fit. When ignition takes place the gas is not exploded; it is expanded and the pressure increases approximately four times. The extent of the force delivered against the piston will depend upon the amount of compression, the quality of

the mixture and the point of firing. It is the inertia stored up in the flywheel that carries the piston against compression, for there is a point where there is no explosive pressure being exerted. Naturally enough a certain loss occurs in each cylinder through the power used to drive another piston against compression or to store up inertia in the flywheel. If a certain amount of gas were to be placed in a cylinder and sealed up, but without the gas being at all compressed, there would be an explosion if the gas were to be ignited, but its force would be nothing as compared with that if the same amount of gas were compressed into the small space designed as a combustion chamber.

RINGS TO BE USED ON BUICK

Q—What is the size of the bore of the old 4-cylinder Buick 1910 or 1911 vintage. What size piston rings should be used?—John S. Nelson, Harvey, Ill.

There were several sizes of engines made by Buick in the years mentioned and without knowing the model number it would be impossible to advise you

with accuracy. The model 10 had cylinders $3\frac{3}{4}$ by $3\frac{3}{4}$ in.; the 19-21 was $4\frac{1}{4}$ by $4\frac{1}{2}$ in.; the 16-17 was $4\frac{1}{2}$ by 5 in. The $3\frac{3}{4}$ by $3\frac{3}{4}$ was used in several models between 1910 and 1915. In 1911 there was a size 4 by 4 in., the $3\frac{3}{4}$ by $3\frac{3}{4}$ in. was used. also the $4\frac{1}{2}$ by 5 in. Even if we knew the exact size the information would be more or less valueless, as it must be the cylinders are not all of the same size now and probably all are more or less out of true, so that new rings would now not in themselves provide a remedy for loss of compression, leaking of oil past the rings and piston slap. The best plan would be to remove the cylinders and caliper them to ascertain just their condition as to being truly round. If the car is in good shape otherwise, or can be put in fairly good condition at not too great expense, it will pay to have the cylinders trued up by being reground and then have new oversize pistons and rings made to fit. You will in that way have a good running engine and it cannot be procured in any other manner.

CHANGING SPEEDOMETER GEAR

Q—Have recently changed the 32 by 4 in. tires on a 1919 Chalmers to 33 by $4\frac{1}{2}$ in. cords. This is equipped with a Stewart speedometer driving from transmission. What difference will there be between the speed and mileage shown on the speedometer and that actually run, due to these oversize cord tires?—O. Ulmann, San Francisco, Calif.

With the larger size tires the speedometer will register the mile at about 4965 ft. instead of 5280, so that the speedometer would be off 315 feet. There is some variation in tires and we will use a Goodyear for figures. A 32 by 4 in. fabric tire measures 32.68 in. in diameter. This will make in a mile 621 turns of the wheel. A Goodyear cord of the 33 by $4\frac{1}{2}$ in. size will measure 34.53 in. and will make 586 turns in a mile. Here is a difference of thirty-five turns; that is, thirty-five more with the smaller tires. And thirty-five turns is equal to 315 feet. We have not carried out the fractions as far as might be because, not knowing the make of tires used and proposed to be used, it would be useless and besides, the amount of tread worn off will also make a difference, but this is approximately correct and will convince you it will be necessary to change the large gear from 64 to 66 teeth.

TOO MUCH PLAY IN DIFFERENTIAL

Q—There is an excessive amount of play in the differential of an Oakland 83. The rear wheel can be turned about one-eighth way around before the ring gear moves. Unless the car is started carefully these gears tighten up with a bang and the car starts with a jerk. What the cause and remedy? Publish diagram W. M. James, Milwaukee, Wis.

The cause is excessive wear and lack of

Garage Heating

Different Systems Which May Be Used

SYSTEMS FOR GARAGE HEATING

Q—Explain how to heat my garage to the best advantage. It is a brick building with cement floor 50 by 90 ft., four windows, one large door, one small door, high ceiling, repair shop upstairs.—Jack Tidd, Juliana Street Garage.

In MOTOR AGE of June 12 we had a garage heating article which gave the general working plans of all the heating systems applicable to garages.

Steam is the most generally accepted system for heating buildings of this nature and we suggest you consult a heating contractor in your own or some nearby city.

We could not give you much information without going into the subject more thoroughly than it is possible for us to do at this time. In figuring the amount of radiation and boiler capacity necessary to heat your building many things must be considered—the conductivity of the walls and roof, glass area, temperature desired in coldest weather and lowest outside temperature in your latitude.

Your local heating man can figure this better than we can, as he knows local conditions and has all the figures at his command, besides being able to inspect the building.

Figures 5 and 6 show four systems of steam heating, one of which will probably meet your requirements.

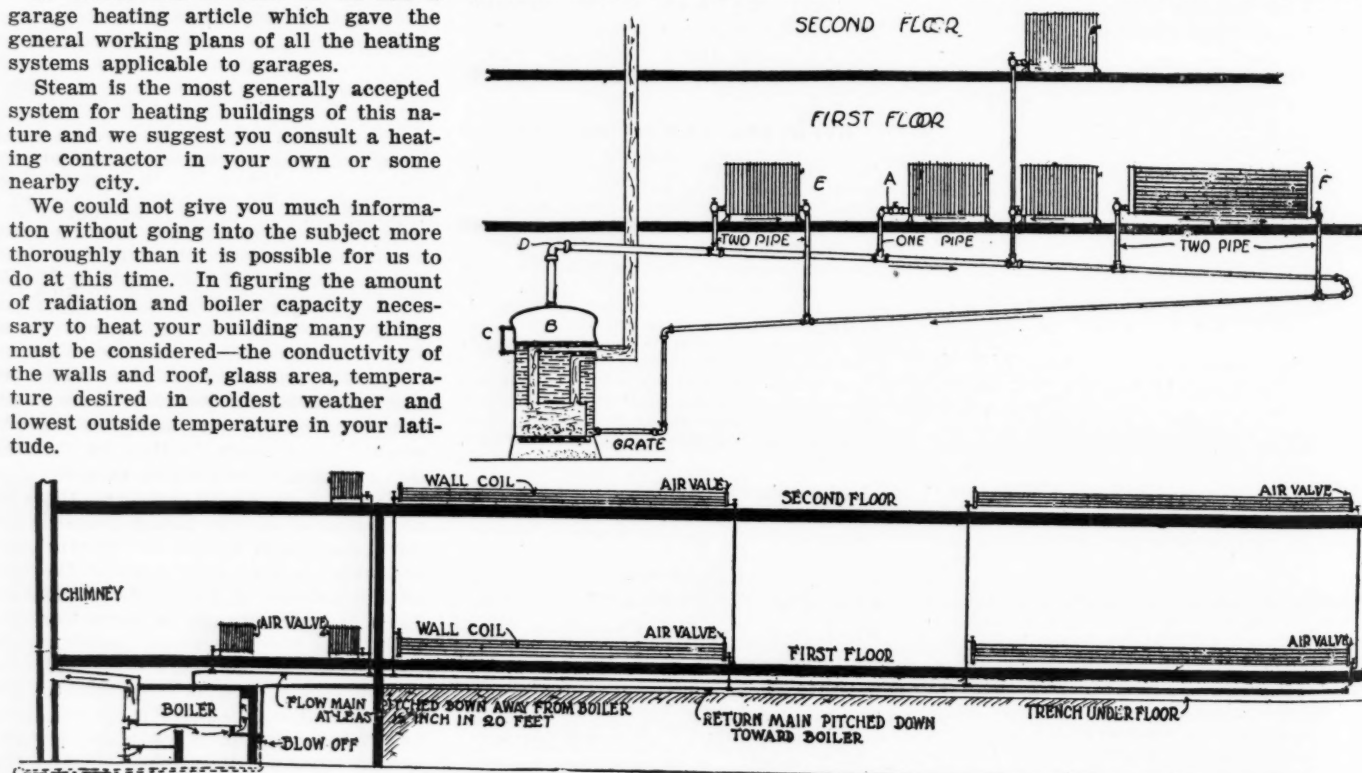


Fig. 5—Above, outline of simple piping system for steam heating plant where basement room is available under the first floor. The above illustration shows an application of this system with the necessary modifications for a garage where basement room under the whole first floor is not available.

adjustment all through and if the car is continued in use you will be towed in some day. Undoubtedly a great amount of the play can be taken up by adjustment, but probably new differential gears, a new spider and possibly new drive shafts will be needed to take up so much play. It would be well to take down the axle and make a close examination of all these parts, for otherwise it will be impossible to tell where the trouble lies. You can, of course, attempt to make adjustments, but the trouble will be that in all probability the axle will have to be taken down and just that much time will have been lost. There may be wear on the splines on the drive shafts, some on the corresponding parts in the differential gears, the spider may be loose and there is a possibility that the bevel gear casings have separated.

CLUTCH ON 1916 HUPMOBILE

Q—Illustrate any give adjustments of the clutch on a 1916 Hupmobile N.—Gridley Garage, Gridley, Kan.

The clutch-cam lever is provided with holes at different distances from the cam, Fig. 7. This arrangement changes the pressure necessary to disengage the clutch and also changes the distance necessary for the clutch to be thrown out before the clutch brake will become operative. When the clutch trunnion connection is made at the lower hole in the clutch-cam lever, a little more pressure is required to disengage the clutch, but the clutch brake will operate more quickly. When this connection is moved to a higher hole, less pressure is required to disengage the clutch, but the clutch brake will operate a little more slowly.

ADJUSTING HUP AXLE

Q—A 1915 Model K Hupmobile will miss during acceleration for three or four blocks and then it will run perfectly. It also does this on stopping and starting

for traffic. It will miss on first and second, but will run all right on high. I have been told the generator does not generate a hot enough spark. This car is equipped with a one-unit Westinghouse starter and generator, Atwater Kent Ignition and a Zenith carburetor.

2—Illustrate in detail how to adjust the rear axle on this car to keep it from humming.

3—What kind of engine is in Vail's Philbrin?

4—Do you need a leaner or richer mixture at high speed than at low speed?—Harold E. Riester, Detroit.

1—We do not believe your trouble is in the generator, else the difficulty would manifest itself more or less at all times. It would be well, however, to clean the brushes and the commutator and go over all connections to be sure there is no leak of current. It seems more like a sticking valve or weak valve spring, or both. Carbon will collect on the valve stem with the present grade of fuel, and this will let the valve stick in the guide. Try

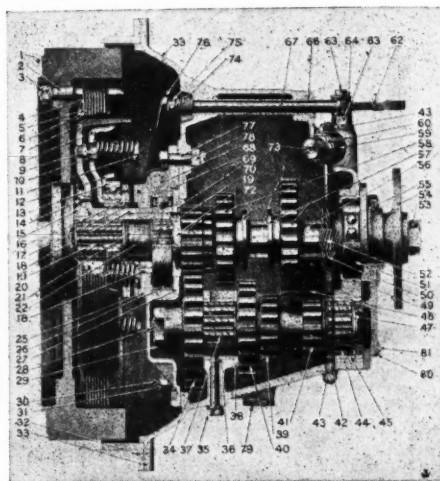


Fig. 7—Clutch and transmission on 1916 Hupmobile.

running half a pint of kerosene through the carburetor, with the engine running at fair speed, and dropping the kerosene into the carburetor in small quantities. This will have a tendency to loosen any grime on the valve stem. If this does not remedy the trouble, take the valves out and see that the stems are clean. At the same time test the springs, one with another, to see if one or more happens to be weak. With an Atwater Kent timer little current is required.

2—This is shown in Fig. 9. It requires experience to make a proper adjustment of a rear axle, else trouble may result. There should be only enough play between the pinion and ring gear to pass a cigarette paper without tearing. In the figure note that there is an adjusting nut shown at A, which is held in place by a lock-nut and a little wedge that drops into the notches in the nut. You will find a little covering on top of the torque tube and this may be opened to expose the adjusting nut. After taking out the holding wedge use a blunt punch to drive the adjusting nut. Turn this to the right, when looking toward the back of the car, and do so a notch at a time.

At C is another adjusting nut, but it will be on the opposite side, which is not shown in the figure. This also is to be turned to the right, when looking at the right-hand wheel. This movement will force the ring gear toward the pinion and the other adjustment will force the pinion toward the pinion. The pinion ought to mesh into the ring gear a little more than enough to bring the edges on a line, for the thrust will force the pinion back a little and bring the edges in line.

3—Vail's Philbrin is in reality a Duesenberg car, the same one in which Thurman turned over at Indianapolis on June 1, 1919.

4—You do not require a richer mix-

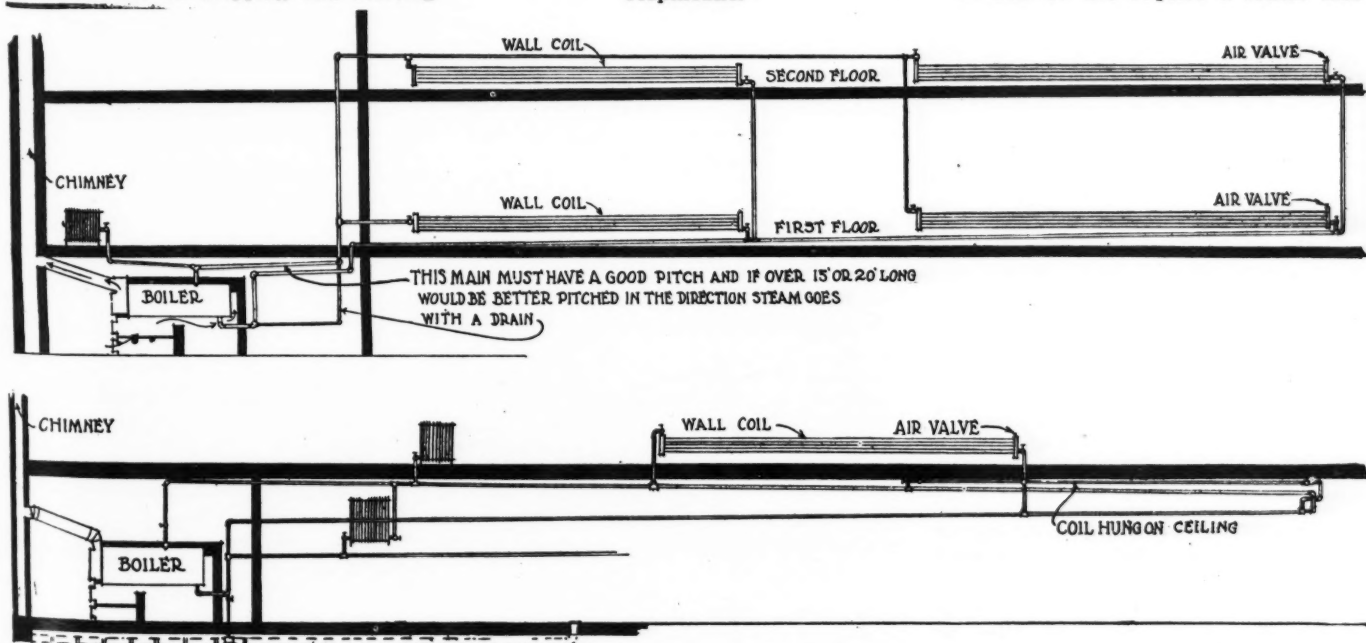


Fig. 6—Above, the boiler is here in the small basement, but the mains are run above the floor. This is a good arrangement where there are no doorways to be crossed. If an excavation is impossible the boiler can be set on the main floor and mains, radiators and coils placed as here shown. The objection to this is the upper air becomes overheated, while the floor remains cool.

ture, but rather a greater volume of mixture to compensate for the greater amount required with a wider throttle opening. Still, if it were one or the other, a richer mixture would perform better than a lean one. Most carbureters are now so made as to give additional fuel, as well as additional air, when the throttle is opened.

GEAR RATIO FOR SPEEDOMETER

Q—Desire to transfer a Van Sicklen speedometer from a Marmon to a special roadster with 32 in. wheels, the gear ratio of which is $2\frac{1}{2}$ to 1. What gear ratio should be used in order to drive from the main shaft next to transmission instead of from front wheel.—W. Neal Walden, Evansville, Ind.

We could not advise you in this without knowing absolutely the gear ratio and the size of tires used on the Marmon. Two gear ratios were furnished on Marmon cars—3.69 to 1 and 4 to 1. We know the tires were 32 by $4\frac{1}{2}$ in. Inasmuch as you will have to procure the necessary parts from the maker of the speedometer, we suggest you give all the information when ordering from the Van Sicklen Co., Elgin, Ill., and that concern can supply your wants and give installation instructions.

GABRIEL HORN ON BUICK

Q—Instruct how to install a Gabriel three-tone horn on a Buick Six 1920.—Lewis R. Salsbury, Billings, Mont.

We are inclined to believe you have not followed instructions in installing the horn, for it is preferable that the connection be made back of the muffler, as shown in Fig. 10. Place the valve near the muffler, at the outlet, if possible as stated. All seams and joints must be tight to prevent gas from escaping. Use $2\frac{1}{2}$ to 4 ft. of 1 in. pipe between the valve and the horn. Good steam hose may be used when the valve is placed at the outlet of the muffler. The cable and spring should open and close the valve fully when the pedal is operated and the cable should pull as direct as possible. Fasten the horn firmly on the side frame or on top of the running board, with the open end forward. The bands must not cover any part of the openings in the sides of the horn. Put a street ell in the valve outlet leading to the horn before placing on the exhaust pipe.

WHEELS OUT OF LINE

Q—Why does one front tire wear more than the other? The axle and steering apparatus is in line. The tires were put on new at the same time and same make and size. The left shows decided wear and the other hardly any.—J. J. Schneider, Springfield, Ill.

It is certain the wheels are out of alignment, but at what point will have to be determined by a checking up of all the parts. This very matter has been treated in MOTOR AGE from time to time, yet naturally is a timely subject. Be sure the front axle is at right angle with the frame of the car and that it is parallel with the back axle. Possibly

the spring seats have slipped. Procure a long straight edge in the form of a perfectly straight board. Place this along the side of the rear tire, as shown in Fig. 8, and then line up the front wheel on the same side. Leave this as it is, take the straight edge and place it against the other rear wheel and see note the position of the front wheel on that side. Now, for the purpose of making an adjustment disconnect the tiebar and set the second front wheel as you did the first one. The front wheels should toe in about $\frac{1}{4}$ in.; that is, there should be that much more distance between the felloes at the back than in front

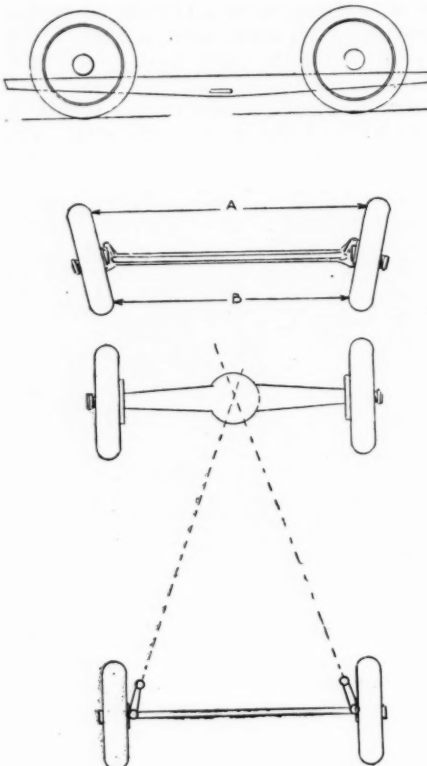


Fig. 8—Wheel alignment chart. Suggested method for aligning up the front wheels the distance B should be $\frac{1}{4}$ -inch less than the distance A.

when measured at the height of the spindle, as in Fig. —. You will have to lengthen or shorten the tiebar adjustment, as the case requires, so the two steering arms can be connected. Ten chances to one one of the arms has been bent; if so, it must be straightened, although it will be possible to run a little when the readjustment has taken place as directed and with little damage.

After you have lined up the wheels and have set the front ones so the spread is $\frac{1}{4}$ in. more at the back than at the front, set the wheels straight ahead. This can again be determined by the use of the straightedge. Take a stout cord and hold it exactly over the center of the kingpin and exactly over the middle of the rear axle. The pin that connects the tiebar to the steering arm should be exactly in line with the string. This should be repeated on the other side. Such a trial will show which arm, if either, is bent. See Fig. 10.

3—Yes, it will, and the large gear will have to be changed to accommodate the changed size. Not knowing the make of your speedometer we can not advise you just what size to use. Ordinarily you would be using a 64-tooth main gear and if this is the case you should have a 66-tooth.

4—No more than that it will stand in the same proportion of benefit as on a level road. In a cord tire there is slightly less loss in transmission of power between the road wheel and the ground and, this being the case, some benefit would accrue from the use of cords.

5—The weight of the standard five-passenger touring car is stated by the maker to be 2300 lbs.

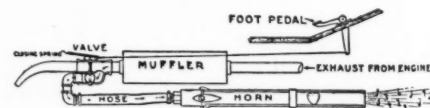


Fig. 10—Method for installing Gabriel horn on Buick.

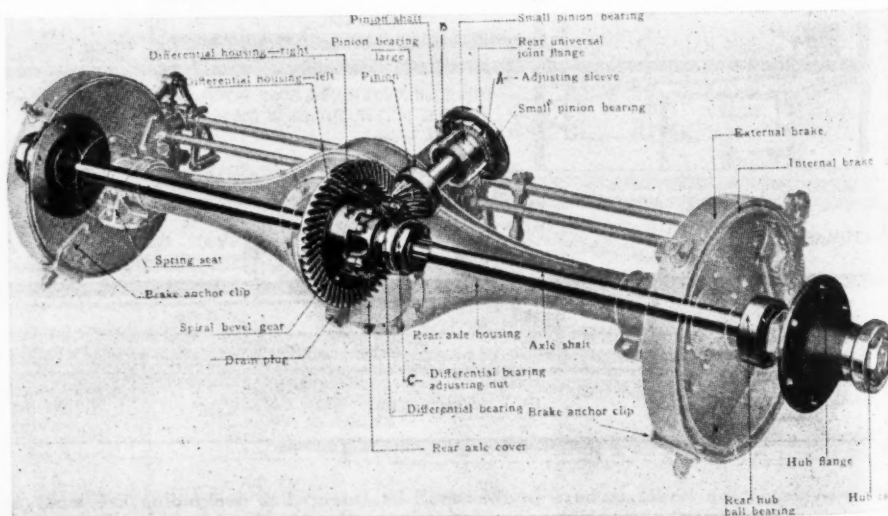


Fig. 9—Rear axle on Hupmobile model K 1915.

The Electric System

RECTIFIER FOR FORD MAGNETO

Q—Who makes a rectifier for the Ford magneto and what will be the capacity of the Ford magneto with this rectifier as a battery charger?

2—Is a rectifier practical for a Ford magneto and will it keep the battery charged for use of lights alone?—Herbert E. Beck, Norfolk, Va.

1. We know of nothing of the kind that is made to install on a car.

2. It would not be as practical and as cheap to rig up as it would to procure a direct current generator and install it on the car, to be driven by the engine. Several concerns make fittings that could be used for this purpose, and a simpler method would be to set the generator on a bracket and bolt it to the crankcase and then use a pulley to take drive from a long fan belt, made to pass over the engine pulley, the fan pulley and the pulley on the generator, as suggested in Fig. 12. This will not call for as much work and expense as will your proposition. Car wreckers all over the country have used generators on hand and one can be bought at from \$12 to \$20. We have noticed many such advertised in *MOTOR AGE*. This idea will then permit you to use the regular Ford magneto for ignition and in emergency the battery can also be used for ignition.

MAXWELL DOES NOT CHARGE

Q—I have been working on a 1917 model Maxwell and cannot make it charge the battery. The starter works O. K. and as

far as I can find there is no short circuit in the wiring. The generator heats when running. The starter switch connections are all good. It shows about 5 to 8 amperes charge on ammeter but none at battery. The generator was overhauled not long ago. What can cause this?

2—Can a Delco generator as used on a Buick be run with a small engine to charge a battery? If this is possible, show connections.—John Renken, Pleasant Plains, Ill.

1—The very fact that the generator heats and that you get no current to the battery is evidence that either there is a poor connection somewhere or that a wire or some strands of a wire may be broken. The current must go somewhere and unless it can find an outlet naturally the generator will heat. It will be necessary to go over the wiring system thoroughly and if possible test the system out.

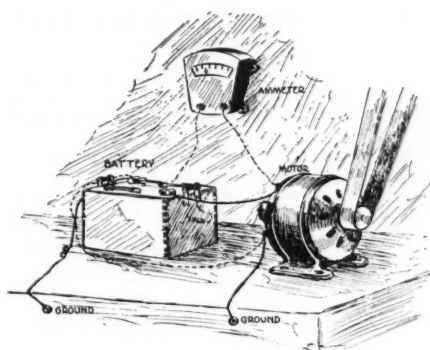


Fig. 13—Method for charging battery.

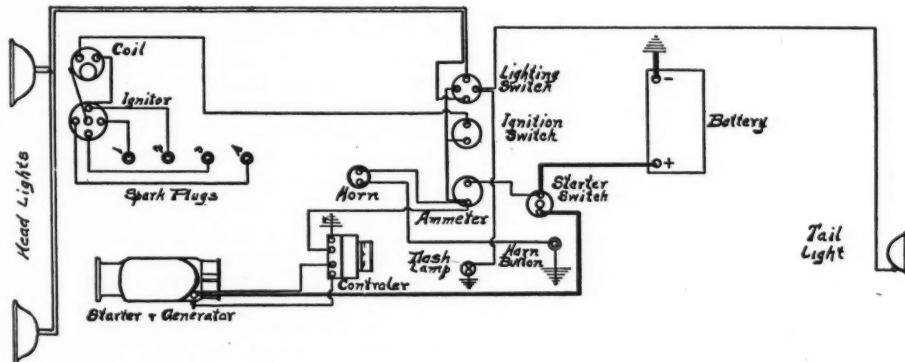


Fig. 11—Wiring diagram of Crow-Elkhart 1914, Gray and Davis system.

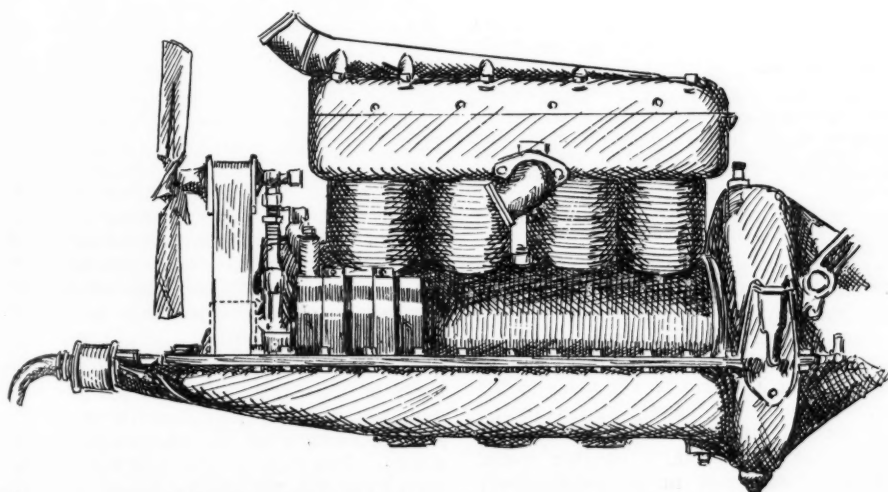


Fig. 12—Method for installing generator on Ford.

2—This is entirely feasible and a good idea, particularly where shop machinery is in operation. The small amount of power loss will not be felt in the operation and at the same time a profit is being derived. Any form of drive may be employed, such as a belt to a line shaft. In one instance reported to *MOTOR AGE* a garage man who has alternating current for light has rigged up an alternating motor direct connected to drive the direct current generator, interposing an ammeter. A suggestion is offered in Fig. 13. If the generator is placed on a bench it will be necessary to connect one terminal of the battery with the base of the generator to provide a circuit. Ordinarily the ground would be the frame of the car. Or it will be just as well to make a direct connection as shown by the dotted line between the battery and the base of the generator. A direct connection may also be made from the binding post on the generator to the other terminal of the battery or, as shown by the upper dotted lines, an ammeter can be interposed in the line. Rigged this way the generator should be figured to turn from 1200 to 1500 r.p.m. and this will charge at about 10 or 12 amp. Thus it will require some six or eight hours to charge an 80 amp. battery. If it is desired to charge a couple of batteries at the same time they should be connected in series but, of course, the time for charging will be double.

REGULATION OF GRAY & DAVIS

Q—What type of regulation is used in the Gray and Davis generator on the 1914 Crow-Elkhart 4?

2—What disposition must be made of the battery terminals to use car without battery? It is desired to start the car on dry cells and then switch to generator for ignition and lights.

3—Would not the cutout points have to be held in a closed position in order to have the current flow at low generator speeds? It seems that if the battery terminals are short circuited, as advocated for some systems when used without the battery, all the current will flow through there and none through the ignition and lighting systems.

4—Publish wiring diagram for this car.

5—Where can repairs for the Sevison breaker head be secured?—Dale L. Fritcher, Nashua, Ia.

1—This is a conventional type of cut-out, with a constant speed generator, governed by the friction clutch in the generator.

2—See answer to No. 3.

3—Do not attempt to do anything of the sort; it will not work. If you grounded the terminals there is still no outlet for the current and the result would be a burned out armature. Besides, you would have nothing to govern the current, as you have where a battery is connected.

4—This is shown in Fig. 11.

5—The Sevison ignition system is now made by the Standard Ignition Co., Elkhart, Ind.

Rebuilding a Buick

Q—Publish speedster design for a Buick 37.

2—Is it advisable to use $4\frac{1}{4}$ or $4\frac{1}{2}$ to 1 gear ratio and light pistons with $1/16$ or $\frac{1}{8}$ in. higher head for power and slow going on high? I don't care about speed, but should not the compression be decreased?

3—Does the Dunn Counterbalance Co. make counterbalances for this car?—Raymond J. Stillman, Waterloo, Iowa.

1. This is shown in Fig. 13. The Buick when rebuilt will resemble the Reo shown in this figure, so that the differences will not be apparent in a sketch of this nature.

2. We do not think it advisable to use the gear ratios you mention, unless you are going to use the car in very hilly country. A ratio of about 4 to 1 is good for average conditions and the fitting of light weight pistons will not materially affect the pulling of your engine, nor increase the power. Lightweight pistons reduce vibrations materially and thus make for a snappier engine. Lowering the compression will be all right but we should think 1-16 in. would be sufficient to raise the head.

3. No. So far as we know these are restricted to use on Fords.

BUILDING A TRACTOR

Q—I am going to build a tractor and would like to know if it makes any difference in the way the pull comes on the sprocket? As it is now the pull comes on the lower chain instead of the top, as in most cases. I want to do this to shorten the wheel base.—C. S. Blair, auto repairing, Dinton, Kan.

It would make no material difference, but it will be necessary to see that the distance between sprocket centers is not lessened and it would be well to keep a pretty close adjustment of the chains through the distance rods.

Reo as Racing Roadster

Q—Publish suggestion for converting a 1913 Reo touring car into a racing roadster.—S. W. Leseske, Hartford, Conn.

A racing roadster design is shown in Fig. 13

BUILDING NATIONAL RACER

Q—We are expecting to build a racing car and have a National roadster which we are going to rebuild for track work. Will you give us your suggestions how to get the best speed out of it? The National company has told us to install exhaust camshaft on intake side. We notice the exhaust shaft has quite a lift but is about $\frac{1}{2}$ in. blunt on the points. Should they be reground to a sharp edge? This car is series V-N-1 No. 7257.

2—What size Master carburetor should be used?

3—Do you advise counter balancing the crankshaft with weights and lightening the flywheel?—A Reader, Williston, N. D.

1—Do not regrind the camshaft to a sharp edged point. This will reduce the space time opening of the valve which is directly opposite to what you should do to increase or better the valve opening cycle.

2—A $1\frac{1}{2}$ in Master carburetor will be large enough for this car.

3—Unless you are able to calculate

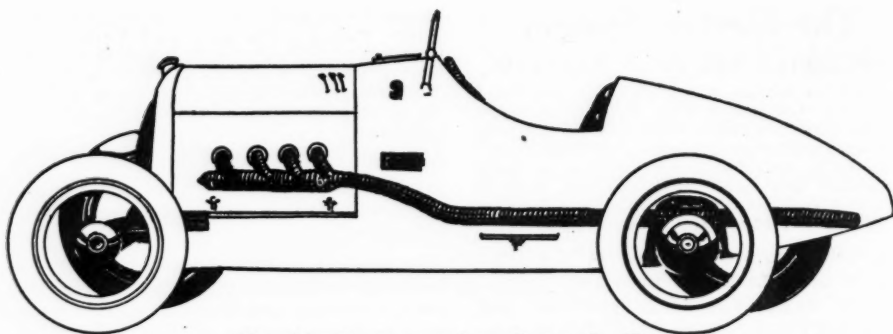


Fig. 13—Racing roadster design for Reo

exactly how much balancing is needed, we advise you to leave this balancing problem alone and pay more attention to the lightening of the reciprocating parts. If the flywheel is perfectly balanced there will be no gain by making it lighter.

FOR SPEEDSTER WITH MOTORCYCLE ENGINE

Q—Publish a sketch showing shaft connections with engine and rear wheels of a speedster using a motorcycle engine and wheels.

2—Publish sketch showing steering gear suitable for such a speedster.

3—What wheelbase would you advise using?—J. M. Bridges, Jackson, Miss.

1 and 3—Please refer to MOTOR AGE of

October 16 last. This gives a plan view of the new Spacke light car, which has a wheelbase of 90 in. and is about right. In this car a planetary transmission is used and the installation is as simple as can be designed. There is no differential, however, the difference in wheel travel being cared for by the narrow tread and slipping of one wheel. You do not state what sort of axle or transmission you intend using, and it is impossible to give a more definite answer.

2—The simplest steering outfit will be one similar to that used in the Spacke, as one similar to that used in the Spacke. Possibly the Spacke Machine Co., Indianapolis, Ind., can furnish such an outfit.

Rebuilding a Chalmers

Q—I am rebuilding a Chalmers 6-30, 1916, into a speedster. The cylinders are being reground, due principally to piston pin scores. These scores are so deep that it will be necessary to remove at least 3-32 in. from the walls. Do you think that will weaken the walls so as to make them unsafe? The cylinder walls seem to be $\frac{1}{4}$ to 5-16 in. thick.

2—I have an opportunity to secure a floating American rear axle and gear, ratio 2.9 to 1. What speed should I get with engine in first-class condition, Miller carburetor, standard valve timing, weight about 1500 lb., lowered frame, wire wheels 33 by $4\frac{1}{2}$ in. rear, 32 by 4 in. front?

3—Do you think a 2.9 to 1 ratio too high? I wish to have a fair degree of flexibility. The present ratio is 4.75 to 1, speed around 50 m.p.h. I believe that my low gear with the 2.9 to 1 ratio will be about equivalent to second gear with 4.75 to 1 ratio.

4—Give suggestions relative to valve timing which will increase the efficiency of the engine.

5—Do you recommend grinding heels from cams? I intend to make numerous changes in the engine, such as enlarging oil lines, installing hand pressure oil pump from tank on side. This system to be splash only. Installing "Hot Spot" of my own design similar to one used on Mercer.—D. C. Galvin, Youngstown, Ohio.

1—We do not think it will be safe to take anywhere near 3/32 in. off the cylinder walls, for you might break through if there happened to be a comparatively thin spot anywhere. Score marks can be filled up and it would be far safer to try this. Consult the advertising columns and you will find a number of concerns which make a specialty of this work. Nowadays only .004 in. is permissible; that is, the Society of Automotive Engi-

neers has set a standard and this means that cylinder walls are made thin enough so .004 is the limit of safety.

2—In the first place, we cannot see how you can get the weight down to 1500 lb. unless you mean for the bare chassis, and then you will have a hard time to make it. But if you can get down to this weight and the engine will pull a 2.9 to 1 axle you ought to get above 65 m.p.h.

3—Yes, we think this ratio is too high unless you intend using the car for racing only and then you will have difficulty in getting under way; that is, it will not be quick to start, but under favorable conditions as to road surface you will be able to get good speed.

4—This high gear ratio will pull down the engine speed to an appreciable extent and right there you are going to lose effectiveness because the engine will not be able to turn over its maximum number of revolutions. If you can enlarge the valve seats and put in larger valves, you will help the engine in the work you intend to thrust on it. We would advise larger manifolds to take care of the bigger charge and exhaust. Your ignition timing can be advanced a little with advantage and the valve timing can be set ahead a tooth.

5—It will be well to try out the engine before attempting to grind off the heels of the cams. This is not uncommon practice and will make a snappier engine because of the change in valve action. The fact is you are building a racing car and you cannot expect it to be a flexible comfort wagon.

The Motor Car Repair Shop

Practical Maintenance Hints

A Few Practical Hints on the Uses for Solder

I HAD a very bad crack in the steam pipe in an automobile which I was repairing. The crack was $2\frac{1}{2}$ in. long, and was spread apart in the center about $\frac{1}{4}$ in. I did not want to take the pipe out, as that would necessitate taking the engine apart, and I would also have to wait a month before I could get it back from the factory.

First I tried soldering with rosin, and filled up the crack with solder, then I started up the boiler and got about 10 lb. steam in the pipe, but it started to leak, as the pressure was too much for the solder. I then decided to try another plan, as I had only 100 lb. pressure in the boiler and had to get 250 lb. I decided to do a better job with the solder.

Wind Pipe with Wire

This time I cleaned up the pipe very clean and got some good solder, and spread around the pipe where the crack was, then took a piece of wire about $\frac{1}{32}$ in. in diameter and wound it tightly around the pipe where the crack was, after which I put another coat of solder on the wire, then added still another coat after the first hardened. Then I started up the boiler with 150 lb. of steam pressure, and finding it did not leak, kept adding more pressure of steam, until I had reached the maximum rate, which is 250 lb. and the automobile has been constantly in use for six months since.

Dents in any kind of sheet metal, especially the brass fixtures of an automobile are exceedingly difficult to straighten out and make a neat appearing piece of work. One of the best methods of doing this is to make a clip of metal, steel, or brass, and solder the small part turned at right angles to the metal in the dent. The sunken metal can then be pulled up, the clip unsoldered and the surface polished. It is not necessary to drill a hole in the fixture, and the surface can be smoothed up like new.

Here is something better than a nut on a cyclometer striker. Most of the users of cyclometers on a motor cycle or bicycle find it a hard proposition to keep the cyclometer striker in place on the spoke, because the repeated sharp blows that occur when riding fast will loosen up most any screw, and turn the striker around, often breaking it entirely.

overcome this difficulty by fitting a I have found a very good way to

piece of hard leather on the hub end of a broken bicycle spoke, which was cut about 3 in. long. The other end of this piece was wrapped tightly around a spoke in the wheel in the proper position. Then a little solder was applied, and both soldered tightly together by using a blow torch. Leave a free end of about 1 in. to give some spring to the striker to soften the shock of the blow. If the job is well done it will stand up very well.

Starting an Obstinate Bolt

Recently, while working on an automobile, I found it difficult to get a bolt started in its place, and when I had about decided to remove the other parts to enter the bolt, I hit upon the following scheme of overcoming the difficulty. A piece of wire was procured, and one end lightly soldered to the bolt head.

This served as a handle for placing the bolt, and was easily removed by giving the wire a few turns. The same means can be used to enter bolts and pins in places not easily accessible, the time of preparation being small as compared with the practical value of the device.

When one of the inside tubes of the radiator springs a leak and it is impossible to get at it to solder, turn the radiator upside down, cut square hole in bottom directly under the leaky pipe; then dip a small piece of waste in "smooth on iron cement" and push it into the pipe, being sure to get it clear to top of pipe. (To do this get a rod the right size and mark on it the length and then drive plug in with rod until the mark is even with the other end of the tube). Keep on this way until you have a plug $\frac{1}{2}$ inches long at each end of pipe. When cement is dry this pipe will be same as solid at each end. Then cut a piece of brass about $\frac{1}{2}$ inch larger each way than the hole, clean, and solder it over hole. This will make a first-class job and will not be noticed.

In soldering the connections of the water supply to an automobile radiator, the connections had been soldered several times, but from the jolt of the machine it would break loose; the radiator being springy would leak with packing between the radiator and water supply. A friend bolted the connection to the radiator, using a piece of packing, then after repeated efforts to

solder over the packing with the products on hand, and failing, he used a paste solder, which held better. By catching the flange of the water supply across the edge of the packing to the radiator with solder held it steady and kept it from shaking and causing the packing to allow leakage.

To solder aluminum, drill as many holes as possible at a slight angle, and drive in tight brass plugs, then file or trim the plugs evenly or a little below the surface of the aluminum. Next clean the surface and apply paste solder with a hot soldering iron. Then put the two surfaces together; heat and treat the same as copper or brass.

Soldering Gasoline Line

The following will be found very useful in soldering connections on the gasoline line on gas engines and automobiles. First thoroughly clean end of pipe and tin end back for about an inch. Then clean small end of sleeve and tin end, inside if possible. Next hold sleeve with pliers and pipe in hand, and hold before flame of torch, and as the solder melts slip sleeve over pipe. Then run a drop of solder around pipe at end of sleeve, and you have a first class gas-tight joint. For a neat job, finish with a strip of emery cloth.

To solder cables to posts set in hard rubber connectors in automobile electric lighting work, without melting the rubber, hold the rubber plug by wrapping in a wet cloth, use solder paste and solder with a small iron.

A crack in a cast-iron pipe or a gasoline cylinder, caused by freezing, can be repaired in the following manner, if the pressure the part has to withstand is not too great: Procure some sulphate of copper, commonly known as bluestone, and dissolve it in water. Clean the edges of the crack well with a file or sandpaper. Paint the iron with the solution several times until there is a coat of copper on it. The copper surface can be easily soft soldered, which will produce a satisfactory repair in most cases.

When the threads on the cap of a grease gun become so worn that it jumps threads, remove plunger and unscrew cap. On the inside of cap solder a nut the same size and thread as the screw. This will make the gun as good as new. Be sure to solder the

nut to the inside of the cap, as it will stand more strain than on the outside.

I had a leak around rivet in the gasoline tank of our car, and could not repair same without removing tank from the car, which would require the removal of the body, so I tried soldering from the outside, but with no results. I then made a patch from a small piece of sheet copper and peining it so that it was dished quite a little, thoroughly tinned the inside of the patch, first applying solder paste, then after applying this to the tank around leak, I next heated my copper very hot and placed the patch on it and put it in position, holding it there and pressing it hard to work out all the surplus solder, and after smoothing up the edges my job was as tight as could be wanted by anyone.

Would advise those who may try this to have their tank absolutely dry and free from gas, as the result of having it otherwise would no doubt be disastrous.—F. H. Sweet, Waynesboro, Va.

PATENT FIGHT FOR BEARINGS

Wilmington, Del., Nov. 27—In the United States District Court here, Judge Hugh M. Morris is hearing the suit of the Standard Roller Bearing Co. of New Jersey, against the Hess-Bright Manufacturing Co. of Delaware, with headquarters also in Philadelphia.

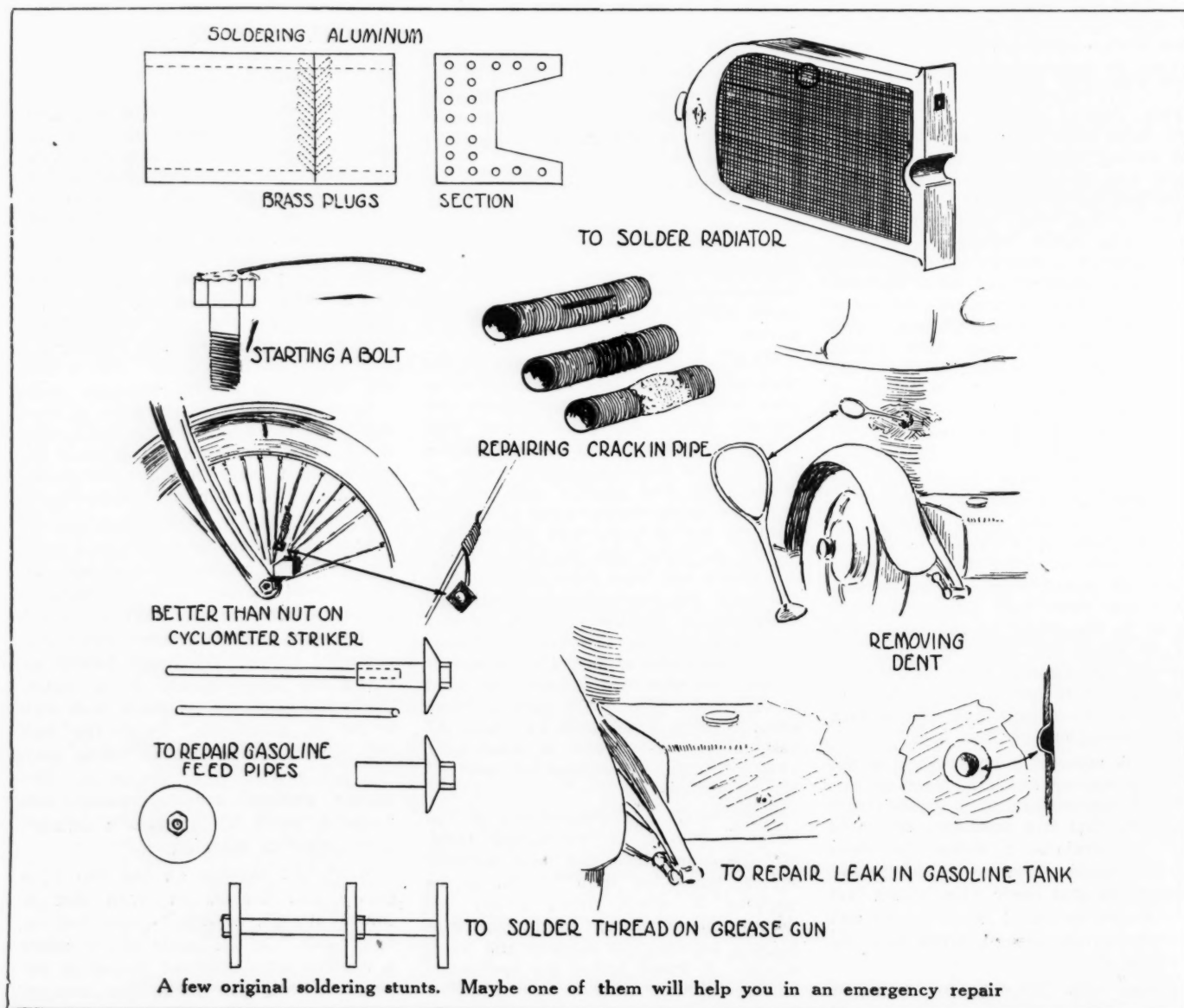
The amount involved is large, running into millions, but cannot be accurately figured, as it involves royalties for several years, and still accumulating, for which the plaintiff asks an accounting, as well as an injunction against the licensing agreements under which ball bearings of a certain type are made by the Hess-Bright Co., the U. S. Ball Bearing Co., the White Co., the Gurney, the New Departure and the Fafner Ball Bearing companies, covering a large part of the output in this country of this essential accessory of the automobile and other mechanical trades.

The litigation is based on the Conrad patents, and arose in 1910 as to the validity of these patents, which has since been affirmed. The Standard company thereafter became a licensee, with exclusive

territory, under a reciprocal agreement with the Hess-Bright Co. In October, 1913, the Standard Co. went into a receivership in New Jersey. It is the action of these receivers in 1916, in changing the terms of the original agreement which is now principally at issue, the plaintiff claiming this to have been wrongful and in prejudice of its rights. The law points involved are complex and the decision is looked for with much interest, as it is the first really important suit of such magnitude to come before Judge Morris since his elevation to the bench a few months ago.

COURSES FOR MOTOR SCHOOLS

As a direct result of several years of experience with civilian and military classes in motor vehicle maintenance, Mr. D. Roesch, associate professor of gas engineering at Armour Institute of Technology, Chicago, Ill., has issued a booklet on automobile mechanics and driving which is adaptable to semi-technical instruction. It outlines class organization and takes up the units of a motor car in logical order.

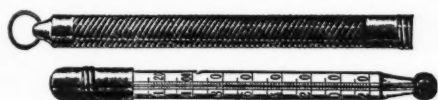


Service Equipment

Time Savers of the Shop

OIL STORAGE SYSTEM

AN oil storage system for handling any number of different oils and which occupies a very small amount of the valuable space in the service station is being made by the Wayne Oil Tank and Pump Co., Fort Wayne, Ind. With this multiple battery stem the oil tanks are kept in the basement and direct pump leads from the tanks are run to the outlet pumps on the service floor. Drains to take care of the overflow from the overfilling of gallon measures, etc., is taken care of by the return drain pipes from the pump located directly under the outlet nozzle, to the tank. A valuable feature of this oil storage system is the method for filling the tanks from the oil drums as supplied by the oil company. These oil drums are lifted by means of a chain hoist on a pivoted rack that is connected to the stationary rack on top of the tank; the oil drum is rolled to its position immediately over the filler opening and there emptied.



Genco battery, thermometer and case

GENCO BATTERY THERMOMETER

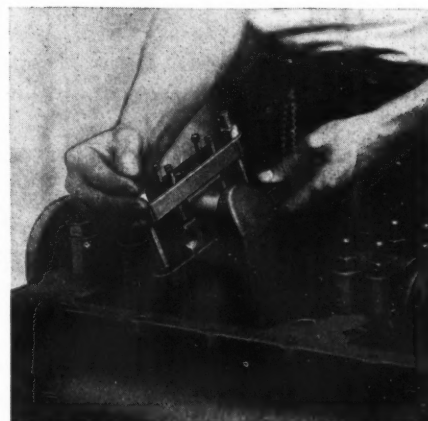
The Genco battery thermometer is a very handy device for the battery repair man, for to him it serves the same purpose as a medical thermometer serves a physician. By testing the temperature of the battery while it is being charged it is possible to determine its exact condition. For instance, if the temperature of

the liquid does not rise much above that of room temperature when being charged then it is an indication that the battery is badly sulphated. If on the other hand the temperature rises to the point where the distilled water evaporates very rapidly then it is an indication that the charging rate is too high. This instrument is made by the General Scientific Equipment Co., Inc., North Philadelphia, Pa.

ATLAS ABRASIVE TOOL

The Atlas bearing tool is designed to replace the turning lathe and the crankshaft grinding machine. With it, it is possible to true up an elliptical bearing on the crankshaft without removing the engine from the car or the crankshaft from the engine. It is only necessary to drop the bottom pan of the engine and apply the tool and then it is a question of a few minutes' time only before the shaft is round, its measurements being accurate to the thousandth of an inch. The illustrations show the tool when it is applied to a crank pin bearing on the crank case of the engine that has been removed from the car. This is done in order to make it possible to take a good picture. This tool is made by the Atlas Manufacturing Co., Pittsburgh, Pa.

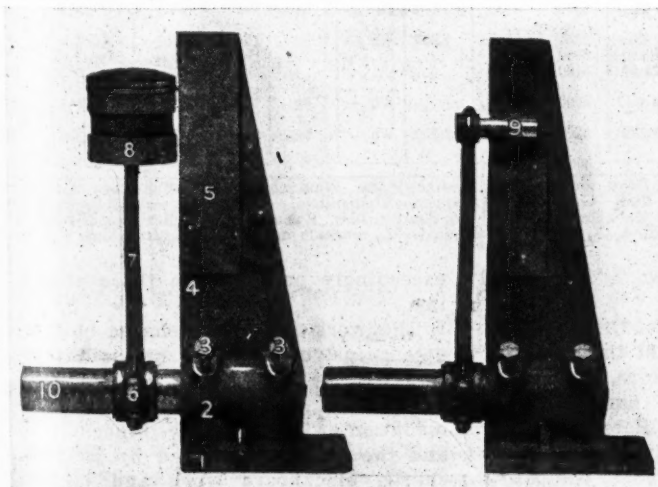
ment of connecting rods and pistons. Very recently there has come to our attention an aligning jig for connecting rods and pistons made by Stevens & Co., 375 Broadway, New York. The illustration shows the jig with its various parts; 1, being the aligning stand; 2, Body with 1½ in. hole for arbor; 3, Set screws to hold arbor; 4, Front surface of machine perfectly square with axes of arbor; 5, Machine surface used for testing if connecting rod is twisted and is perfectly parallel with axes of shaft; 6, Connecting rod with bearings; 7, Connecting rod stem; 8, Piston; 9, Wrist pin in position for aligning; 10, Arbors are made standard crankshaft sizes.



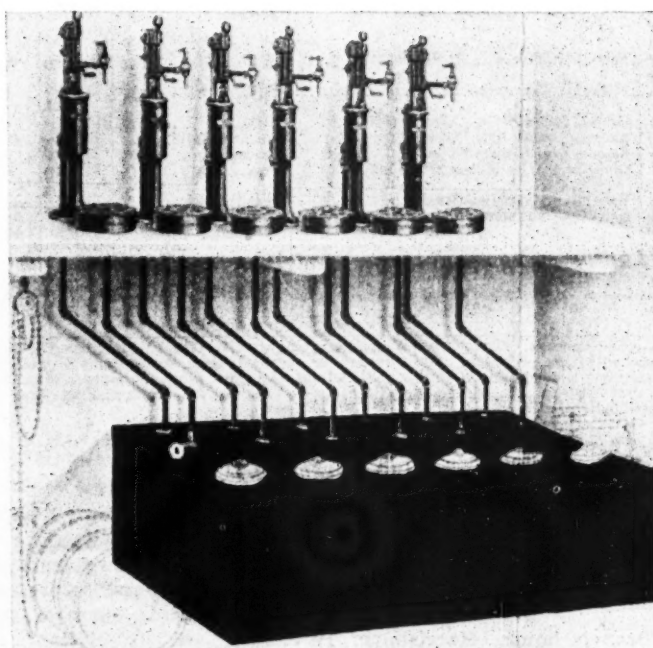
Atlas bearing tool

STEVENS ROD AND PISTON GAGE

MOTOR AGE through its repair columns has from time to time suggested many devices for truing up and testing the align-



Stevens rod and piston gage to take different arbors



Wayne oil storage system handles many grade of oil

Motor Age Monthly Guide to Tractors

Tractor Specifications Appear the last issue of each month

Line No.	Manufacturer	Tractor and Model	Drawbar horsepower	Belt horsepower	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinder	Bore and stroke	Normal R. P. M.
1	Advance-Rumely Thresher Co., Laporte, Ind.	Oil Pull.....	12	20	3	22 x 36	2150	6682	.....	Wh.	51	Own	2 Hor.	6 x 8	560
2		Oil Pull.....	16	30	4	28 x 44	2850	9600	.....	Wh.	56	Own	2 Hor.	7 x 8½	530
3		Oil Pull.....	20	40	5-6	32 x 52	3750	12820	.....	Wh.	64	Own	2 Hor.	8 x 10	450
4		Oil Pull.....	30	60	8-10	36 x 60	5900	26700	.....	Wh.	80	Own	2 Hor.	10 x 12	375
5	Allis-Chalmers Mfg. Co., Milwaukee, Wis.	Allis-Chalmers, 18-30..	18	30	3-4	.....	2400	6200	\$1,785	Wh.	50	Own	4 Ver.	4½ x 6½	830
6		General Purpose.....	6	12	{ 1-16 2-12 }	.....	1000	2500	695	Wh.	48	Le Roi	4 Ver.	3½ x 4½	1000
7	Appleton Mfg. Co., Batavia, Ill.	Appleton.....	12	20	2-3	22	2000	4900	1,650	Wh.	54	Buda	4 Ver.	4½ x 5½	1000
8		Aultman-Taylor.....	15	30	4	28	2800	7500	2,300	Wh.	70	{ Clim. Wauk.	4 Ver.	5 x 6½	900
9	Aultman-Taylor Machinery Co., Mansfield, Ohio	Aultman-Taylor.....	22	45	6	32	4800	13000	3,700	Wh.	70	Own	4 Hor.	5½ x 8	600
10		Aultman-Taylor.....	30	60	8-12	.....	8000	23000	4,800	Wh.	90	Own	4 Hor.	7 x 9	500
11	Automotive Corp., Toledo, Ohio.....	Automotive, B-B.....	12	25	2	30	1800	.....	.....	Wh.	40	Here.	4 Ver.	4 x 5½	1000
12		Avery, 6-cyl.....	8	16	2-3	22 x 32	3150	.....	.....	Wh.	38	Own	6 Ver.	3 x 4	1200
13	Avery Co., Peoria, Ill.	Avery, 8-16.....	8	16	2-3	22 x 32	1800	4900	.....	Wh.	50	Own	2 Hor.	5½ x 6	600-700
14		Avery, 12-25.....	12	25	3-4	20 x 30	2800	7500	.....	Wh.	56	Own	2 Hor.	6½ x 7	600-700
15		Avery, 14-28.....	14	28	3-4	24 x 36	3000	6800	.....	Wh.	60	Own	4 Hor.	4½ x 7	700-800
16		Avery, 18-36.....	18	36	4-5	{ 24 x 36 28 x 46 }	3500	9250	.....	Wh.	65	Own	4 Hor.	5½ x 6	650-750
17		Avery, 25-50.....	25	50	5-6	{ 28 x 46 32 x 54 }	4800	12500	.....	Wh.	69	Own	4 Hor.	6½ x 7	600-700
18		Avery, 40-80.....	40	80	8-10	36 x 60	7600	22000	.....	Wh.	87½	Own	4 Hor.	7½ x 8	500-600
19	Bates Mch. & Trac. Co., Joliet, Ill.	Steel Mule.....	15	22	3-14	28-30	.....	4400	1,985	Cr.	.....	Erd	4 Ver.	4 x 6	900
20	C. L. Best Gas Trac. Co., San Leandro, Calif.	Tracklayer, A.....	35	60	9-14	.....	6500	17500	5,750	Cr.	.....	Own	4 Ver.	6½ x 3½	650
21		Tracklayer, B.....	12	25	3-14	.....	2000	5100	2,600	Cr.	.....	Own	4 Ver.	4½ x 5½	850
22	Buckeye Mfg. Co., Anderson, Ind.	Trundaar, 10.....	25	40	4	.....	3750	8500	3,750	Ch. T.	.....	Wauk.	4 Ver.	5 x 6¼	900
23	Bull Tractor Co., Anderson, Ind.	Bull.....	12	24	2-3	26	1000	4996	1,200	.....	60	Toro	2 Hor.	5½ x 7	750
24	J. I. Case Plow Works, Racine, Wis.	Wallis, K.....	15	25	3	.....	2000	3560	.....	Wh.	48	Own	4 Ver.	4½ x 5¾	850
25		Case, 22-40.....	22	40	4-6	26x46	3428	9500	2,600	Wh.	56	Own	4 Ver.	5½ x 6¾	850
26	J. I. Case T. M. Co., Racine, Wis.	Case 15-27.....	15	27	3	20x36	2500	5750	1,600	Wh.	52	Own	4 Ver.	4½ x 6	900
27		Case, 10-18.....	10	18	2	20x28	1665	3400	1,200	Wh.	42	Own	4 Ver.	3½ x 5	1050
28	Cleveland Trac. Co., Cleveland, Ohio.....	Cletrac, H.....	12	20	2-14	24-36	1500	3300	1,585	Cr.	.....	Weid.	4 Ver.	3¾ x 5½	1250
29	Dart Truck & Trac. Corp., Waterloo, Ia.	Blue J.....	15	30	3-4	28	2500	4500	2,000	Wh.	42	Buda	4 Ver.	4½ x 6	1050
30		Blue J, TE.....	12	25	3	24	2250	4300	1,850	Wh.	42	Buda	4 Ver.	4½ x 5½	1050
31	Dayton-Dowd Co., Quincy, Ill.	Leader, B.....	12	24	2	20	2000	5200	1,285	.....	48	Own	2 Hor.	6½ x 6	800
32		Leader, C.....	18	36	3-4	28	4000	6500	2,495	Cr.	.....	Twin	4 Ver.	5 x 7½	750
33	Eagle Mfg. Co., Appleton, Wis.	Leader, CX.....	20	40	4-5	28	5000	6500	2,750	Cr.	.....	Doman	4 Ver.	6 x 7	750
34		Eagle, F.....	12	22	2-3	24	2400	5850	1,400	Wh.	52	Own	2 Hor.	7 x 8	450
35	Electric Wheel Co., Quincy, Ill.	E-B, 12-20.....	12	20	3-14	28	3200	7100	1,850	Wh.	48	Own	2 Hor.	5 x 6	800
36		Allwork, C.....	12	20	3-14	28	3000	5000	.....	Wh.	48	Own	4 Ver.	4½ x 5	900
37	Emerson-Brantingham Co., Rockford, Ill.	E-B, 20-35.....	20	35	5-14	28	3300	9700	.....	Wh.	72	Own	4 Ver.	5 x 7	700
38		E-B, Reeves.....	40	65	8-10	44	10000	22750	.....	Wh.	90	Spec.	4 Ver.	7½ x 9	500
39	Ford & Son, Inc., Henry, Dearborn, Mich.	E-B, Q.....	12	20	3-14	24	2000	6500	.....	Wh.	60	Own	4 Ver.	4¾ x 5	850
40		Fordson.....	12	20	2	20-34	.....	2750	750	.....	42	Own	4 Ver.	4 x 5	1000
41	Four-Drive Trac. Co., Big Rapids, Mich.	Fitch, 4.....	20	35	3-4	28-30	3200	6000	2,800	Wh.	{ F- 36x12 R- 42x12 }	{ Clim. }	4 Ver.	5 x 6½	850
42	Frick Co., Waynesboro, Pa.	Frick.....	12	24	3	22-26	1400	5800	.....	.....	60	.....	4 Ver.	4 x 6	900-1000
43	General Ordnance Co., Cedar Rapids, Ia.	G-O.....	14	28	8-14	30	.....	4200	1,485	Wh.	46	Wauk.	4 Ver.	4½ x 5¾	1000
44		Monarch, 30-18.....	18	30	4-14	28-32	3300	8000	2,550	Wh.	.....	Beav.	4 Ver.	4½ x 6	900
45	Graham Bros., Evansville, Ind.	Graham.....	15	30	3	24	2750	4750	.....	Wh.	52	Hink.	4 Ver.	4½ x 5½	1000
46		Gray Tractor Co., Minneapolis, Minn.	18	36	4	28	3300	6200	.....	Drum	54	Wauk.	4 Ver.	4½ x 6¾	850
47	Hart-Parr Co., Charles City, Ia.	Hart-Parr, 30.....	15	30	3-14	28	3000	5185	1,395	Wh.	52	Own	2 Hor.	6½ x 7	750
48	Holt Mfg. Co., Peoria, Ill.	Caterpillar, 10-ton.....	40	60	6-14	40-60	5000	19000	.....	Cr.	.....	Own	4 Ver.	6½ x 7	700
49		Caterpillar, 5-ton.....	25	40	4-14	32-52	3100	9400	.....	Cr.	.....	Own	4 Ver.	4½ x 6	1050
50	Huber Mfg. Co., Marion, Ohio.....	Huber, 12-25.....	12	25	3-14	24 x 42	2400	5000	.....	Wh.	60	Wauk.	4 Ver.	4½ x 5¾	900
51	Illinois Tractor Co., Bloomington, Ill.	Illinois, C.....	18	30	4	24-28	3500	5200	2,375	Wh.	54	Clim.	4 Ver.	5 x 6½	800

Abbreviations: **Traction**—Wh., wheel; Cr., crawler; Ch. T., chain tread. **Engine**—Beav., Beaver; Veer., Veerac; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Hink., Hinkley. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G., gasoline; K., kerosene; D., distillate. **Carburetor**—Ray., Rayfield; King., King; Donaldson; Ben., Bennett; Holl., Holley; John., Johnson; Opt., Optional. **Magneto**—A-K., Atwater Kent; Sum., Sumter; Eise., Eiseemann; Berl., Berling. **Clutch**—B. & B., Gearset type—Sl. G., sliding gear; Sel.G., selective gear; Fr., friction; Plan., planetary; Sl. J. C., sliding jaw clutch; C. M., constant mesh; Incl. Cl., individual clutch. **Final** Shotwell-Johnson.

CASE TO HOLD SERVICE SCHOOLS

The J. I. Case Threshing Machine Co. will hold free service schools in the East, as follows:

Branch house, Syracuse, N. Y., 356-60 West Jefferson St.—Dec. 2, 3, 4 and 5.

Branch house, Harrisburg, Pa., 21-23 North 9th St.—Dec. 16, 17, 18 and 19.

Rochester, N. Y.—Dec. 9, 10, 11 and 12.

Baltimore, Md.—Dec. 22, 23, and 24.

Students will be taught the operation and care of Case tractors, Grand Detour plows and disk harrows; also threshers, balers, silo fillers and other tractor operated machines.

A. G. Kellam, the Case company's manager at Syracuse, says nothing will be left undone to make these schools

exceedingly profitable to those attending.

The work will be in charge of competent instructors, new and old tractors will be disassembled, adjusted and reassembled, and every known service operation will be gone through with and the work illuminated by lectures, charts, blackboard work and lantern slides. An invitation is extended to all persons interested in power farming.

and Their Technical Specifications

These tables are revised and brought up to date monthly

Line No.	Fuel	Make and size of carburetor	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended plowing speed	Final drive	Drive	Furrow wheel	Line No.
1	K-D	2 1/4-Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	19	560	2790	2	2.1-3.26	2.1	B. G.	Op.	No	1
2	K-D	2 1/2-Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	23	530	3190	2	2.1-3	2.1	G. B.	Op.	No	2
3	K-D	2 3/4-Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	26	450	3060	2	2-3.2	2	B. G.	Op.	No	3
4	K-D	3 1/4-Own	None	Bosch	Own	Own	Sl. G.	Own	Own	Own	Own	36	375	3540	1	1.9	1.9	B. G.	Op.	No	4
5	K	1 1/4-King	Ben.	K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	15	830	3200	2.3-2.8	.....	2.8	.....	.....	Yes	5
6	G	7/8-King	Ben.	Eise. Bosch Eise. Dixie	B. & B.	Own	Sl. G.	Own	Gurney	.....	Own	10	1000	2600	2.4	1 1/2-2.4	2.4	.....	.....	Yes	6
7	G-K	1 1/4-Scheb.	Ben.	Bosch	B. & B.	Nutt.	Sl. G.	Perfex	Hyatt	Own	Hyatt	7 1/2	825	2600	2	2 1/4-3 1/4	.....	I. G.	.....	Yes	7
8	K-D	1 3/8-King	Ben.	Eise.	Own	Own	Sl. G.	Hooven	Hyatt	Own	Own	20	450	2400	1	2.2-2.49	2.55	I. G.	.....	Yes	8
9	G-K-D	2 -King.	.....	Eise.	Own	Own	Sl. G.	Own	Own	Own	Own	20	600	3150	.....	1-2.93	2.13	B. G.	.....	No	9
10	G-K-D	2 1/4-King.	.....	Eise.	Own	Own	.....	Own	Own	Own	Own	24	500	3150	2.2	1-2.2	2.2	B. G.	.....	No	10
11	G-K	1 1/8-King.	Ben.	Eise.	B. & B.	Own	Sl. G.	McCord	Gurney Hyatt Hyatt Bant.	Timk.	Timk.	10	996	2600	2	2 1/4-4	2 1/4	I. G.	In.	Yes	11
12	G-K	3/4-King.	.....	K-W	Own	Own	Sl. G.	Own	Own	Own	Hyatt	12	780	2450	3	1 1/4-4 1/4	2 1/2	S. G.	Op.	.....	12
13	G-K	1 1/4-King.	.....	K-W	Own	Own	C. M.	Own	Own	Own	Own	17 1/2	600	2750	2	1 1/2-3	1 1/2	S. G.	Op.	.....	13
14	G-K-D	1 1/2-King.	.....	K-W	Own	Own	C. M.	Own	Own	Own	Own	19 1/2	570	2910	2	1 1/2-2 1/4	1 1/2	S. G.	Op.	.....	14
15	G-K-D	1 1/2-King.	.....	K-W	Own	Own	C. M.	Own	Own	Own	Own	16	700	2930	2	2 1/4-3 1/2	2	S. G.	Op.	.....	15
16	G-K-D	1 1/2-King.	.....	K-W	Own	Own	C. M.	Own	Own	Own	Own	18	650	3065	2	2-3	2	S. G.	Op.	.....	16
17	G-K-D	2-King.	.....	K-W	Own	Own	C. M.	Own	Own	Own	Own	22	500	2880	2	2-3	2	S. G.	Op.	.....	17
18	G-K-D	2-King.	.....	K-W	Own	Own	C. M.	Own	Own	Own	Own	26	500	3400	2	1 1/2-2 1/2	1 1/2	S. G.	Op.	.....	18
19	G-K-D	4 1/4-Ben.	Ben.	Dixie	B. & B.	Own	Sl. G.	Modine	Timk. Hyatt Timk.	Timk.	Hyatt	12	725	2300	2	2.33-3.5	2.33	S. G.	.....	.....	19
20	D	2-Ens.	Ben.	Bosch	Own	Own	Sl. G.	Own	Hyatt Timk. Hyatt Timk.	.....	Timk.	16	650	2720	2	3-2	3	I. G.	.....	.....	20
21	D	1 1/2-Ens.	Ben.	Split.	Own	Own	Sl. G.	Own	Hyatt Timk. Hyatt Timk.	.....	Hyatt	9	9000	1971	2	2 1/4-3	3	I. G.	.....	.....	21
22	G-K-D	Strom.	Own	Bosch	Hill.	Own	Sl. G.	Modine	Hyatt Timk.	.....	H & T	900	2600	2	1.3-2.5	.....	S. G.	In.	.....	22	
23	G-K-D	1 1/2-King.	Donal.	K-W	.....	.....	Sl. G.	Modine	Hyatt	.....	Hyatt	12	750	.....	1	2.4-2 1/4	2.4	B. G.	.....	.....	23
24	G-K-D	1 1/4 Ben. 2-King.	Ben. Own	Bosch Bosch	Twin Own	Own Own	Sl. G. Sl. G.	Modine Own	Timk. Hyatt Timk.	Timk. Hyatt	Timk. Hyatt	18 16 1/2	450 850	..... 3669	2 2	1 1/2-3 1/4 1.2-3.2	2 1/2 2.2	S. G. S. G.	In. In.	No No	24 25
25	K	1 1/2 King. 1 1/8 King.	Own Own	Bosch King Eise. Teagle	Own Own	Own Own	Sl. G. Sl. G.	Own Own	Hyatt Hyatt	Own Own	Hyatt Hyatt	16 14 1/4	900 1050	3762 3916	2 2	2 1/2-3 1/2 2 1/2-3 1/2	2 1/2 2 1/2	S. G. S. G.	In. In.	No No	26 27
26	G-K-D	1-King.	Own	.....	B. & B.	Own	.....	McCord	.....	.....	.....	8	1250	2600	1	3 1/2	3 1/2	I. G.	.....	.....	28
27	G	1 1/4-King.	Ben.	Split.	Detl.	Own	Sel. G.	Own	Gurney	Timk.	Timk.	12	750	2356	3	1 1/2-6	2 1/2	B. G.	In.	Yes	29
28	G	1 1/4-King.	Ben.	Split.	Delt.	Own	Sel. G.	Own	Gurney	Timk.	Timk.	12	750	2356	3	1 1/2-6	2 1/2	B. G.	In.	Yes	30
29	K-D	1 1/4-King.	Own	King.	Own	Own	Sel.	Eureka	Own	Own	Own	14	800	2800	2	2 1/2-3 1/4	2 1/2	I. G.	Op.	.....	31
30	G-K-D	1 1/4-King.	Ben.	K-W	Own	Own	Sel.	Eureka	Own	Own	Own	14	750	2700	2	1.8-2 1/2	1.8	Ch.	Op.	.....	32
31	G-K	1 1/2-Holl.	Ben.	Dixie	Own	Own	Sel.	Eureka	Own	Own	Own	14	750	2700	2	1.8-2 1/2	1.8	Ch.	Op.	.....	33
32	G-K	2 -Linga	Own	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Own	Own	20	450	2350	2-3	1 1/2	2	G.	.....	Yes	34
33	G-K	2 -Linga	Own	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Own	Own	24	450	2827	2-3	1 1/2	2	G.	.....	Yes	35
34	K	1 1/2-King.	Ben.	King.	Own	Own	Sl. G.	Perfex	Hyatt	.....	Hyatt	13 1/2	800	2500	3	1 1/2-3 1/4	2 1/2	B. G.	.....	.....	36
35	K	1 1/2-Ben.	Ben.	K-W	Own	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	12	900	2800	2	1.81-2.33	2.33	G.	In.	No	37
36	K	1 1/2-Ben.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Own	Own	Own	22	597	2500	2	1.71-2.26	2.26	G.	Op.	Yes	38
37	K	2 1/2-Ben.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Own	Own	Own	2	500	2880	1	2	2	B. G.	Op.	Yes	39
38	K	1 1/2-Ben.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Hyatt	Own	Hyatt	12	708	2225	3	1.64-2.25-3.4	3.4	G.	Op.	Yes	40
39	K	Own	Own	Own	Own	Own	Sl. G.	Own	Gurney	Timk.	(S.R.B.)	9 1/2	1000	.....	3	1-8	2 1/2	Worm	In.	.....	41
40	K	1 1/2-King.	Ben.	Dixie	B. & B.	Cotta	Ind. Cl.	Spirex	Timk.	Timk.	Timk.	14	650	2275	3	3/4-4	2 1/2	F-Bevel R-Worm	.....	No	42
41	K	King.	Ben.	King.	Own	Nutt.	S.	Perfex	Hyatt	Own	Own	13	900	3060	.....	2.3-3.8	2 1/2	S. G.	.....	Yes	43
42	G-K	1 1/4-King.	Ben.	Eise.	.....	Own	C. M.	Perfex	S.K.F.	.....	.....	10	970	.....	6	1 1/2-3	2 1/2	S. G.	In.	No	44
43	G-K	1 1/2-King.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Hyatt	.....	.....	16	600	2600	3	1 1/2-3 1/2	2 1/2	Ch.	Op.	No	45
44	G-K	1 1/4-Strom.	Own	Perf.	Own	Own	Sl. G.	McCord	Hyatt	Timk.	Hyatt	12	930	2900	2	2 1/2-4 1/2	2 1/2	S. G.	In.	Yes	46
45	G-K	1 1/2-Ben.	Ben.	Bosch	Own	Own	Sl. G.	S-J	Hyatt	Timk.	Own	11	850	2600	1	2-2 1/2	2 1/2	Ch.	.....	.....	47
46	K	1 1/2-Scheb.	Own	K-W	Own	Own	Sl. G.	S-J	Hyatt	Own	Hyatt	14	750	2750	2	2-3	3	I. G.	.....	Yes	48
47	G	2-King.	Donal.	K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	14	800	2900	3	1.65-4.75	3	G.	In.	No	49
48	G	1 1/4-Scheb.	Donal.	Eise.	Own	Own	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	12	1000	2700	3	1.5-5.7	3	G.	In.	No	50
49	G-K	1 1/4-King.	Ben.	King.	Own	Own	Sel.	Perfex	Hyatt	.....	.....	13	900	3063	2	2.43-3.75	2.43	S. G.	.....	Yes	51
50	K	1 1/2-Strom.	Ben.	Dixie	Twin	Foot	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	14	600	2400	2	2 1/2-3.4	2 1/2	S. G.	In.	Yes	52

Man
& Ki
& B.
Final

Manufacturers: Auto., Automatic; Weid., Weidley; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth; Spec., Special; Wisc., Wiscogton; Holl., Holley; Scheb., Schebler; Ben., Bennett; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. Air Cleaner—Donal., Borg & Beck; Bier., Bierman; Spec., special; Full., Fuller; Twin, Twin Disk; Hill., Hilliard; Detl., Detlaf; Para., Paragon. Gearset—B. & S., Brown & Sharpe; Nutt., Nuttall. Drive—S. G., spur gear; G., gear; Ch., chain; R. P., roller pinion; I. G., internal gear; B. P., bull pinion. Drive—Op., open; In., inclosed. Radiator—Chand., Chandler; S-J.,

FORDSON ADDS ATTACHMENT

Detroit, Nov. 24—A mower attachment for the Fordson tractor is the latest innovation in farm machinery which has stood all tests and bids fair to take its place along with the tractor in the favor of farmers. It uses the power of the tractor from the pulley shaft, a bevel gear taking the place

of the pulley when the mower is attached. The entire outfit weighs less than one-third the horse-drawn mower and together with the tractor is a strictly one-man outfit. The knives are forward of the driver's seat, making it impossible for the driver to be hurt should he fall from the tractor. The mower is being put out by the Otwell Tractor Equipment Co., Detroit.

IOWA FORDSON MEN MEET

Davenport, Iowa, Nov. 24—The Horst-Strietter Motor Car Co., distributors of the Ford car and Fordson tractor in the eastern Iowa and western Illinois territory, assembled all subdealers and salesmen Nov. 10 to talk over sales methods and outline the campaign for the coming year. After the business meeting during the day there was a

Motor Age Monthly Guide to Tractors

Tractor specifications appear the last issue of each month

Line No.	Manufacturer	Tractor	Drawbar horsepower	Belt horsepower	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinders	Bore and Stroke	Normal R. P. M.
75	Indiana Silo Co., Anderson, Ind.	Indiana	5	10	1		900	2000		Wh.	50	Le Roi	4 Ver.	3½ x 4½	950
76		International	8	16	2		1350	3600		Wh.	40	Own	4 Ver.	4½ x 5	1000
77	International Harvester Co., Chicago	Titan	10	20	3		1800	5710		Wh.	54	Own	2 Hor.	6½ x 8	575
78		International	15	30	4		2500	8900		Wh.	66	Own	4 Hor.	5½ x 8	575
79	J. T. Tractor Co., Cleveland, Ohio	J. T., N.	16	40	3	30	3200	6500	2,800	Cr.		Chief	4 Ver.	4½ x 8	1000
80	Keck-Gonnerman Co., Mt. Vernon, Ind.	Keck-Gonnerman, B.	12	24	3	24 x 40	2500	6500	1,500	Wh.	60	Own	2 Hor.	7½ x 8	700
81	LaCrosse Trac. Co., LaCrosse, Wis.	LaCrosse, G.	12	24	3	22	2000	4000	1,250	Wh.	56	Own	2 Hor.	6 x 7	750
82		LaCrosse, M.	7	12	1-16	18	1000	2600	750	Wh.	48	Own	2 Hor.	4 x 6	1000
83															
84	Lauson, John, Mfg. Co., New Holstein, Wis.	Full Jewell	15	30	3-4	24-30	3000	6500	2,150	Wh.	54	Beav.	4 Ver.	4½ x 6	950
85	Liberty Tractor Co., Minneapolis, Minn.	Liberty	18	32	4	30	3380	5900	2,475	Wh.	48	Clim.	4 Ver.	5 x 6½	850
86			12	20	3	20-24	2000	4200	1,595	Wh.	50	Own	4 Ver.	4½ x 6	1000
87		Twin City, 12-20	16	30	4	24-28	3000	7800	2,400	Wh.	54	Own	4 Ver.	5 x 7½	650
88		Twin City, 16-30	16	30	4	24-28	3000	7800	2,400	Wh.	54	Own	4 Ver.	5 x 7½	650
89	Minneapolis Steel & Machinery Co., Minneapolis, Minn.	Twin City, 25-45	25	45	6	32-34	6700	16000	3,800	Wh.	76	Own	4 Ver.	6½ x 8	600
90		Twin City, 40-65	40	65	8	40	7500	23700	4,850	Wh.	84	Own	4 Ver.	7½ x 9	535
91		Twin City, 60-90	60	90	12	40	11250	2800	5,850	Wh.	84	Own	6 Ver.	7½ x 9	535
92	Moline Plow Co., Moline, Ill.	Universal, D.	9	18	2-14	22	2100	3380	1,500	Wh.	52	Own	4 Ver.	3½ x 5	1650
93															
94	Parrett Tractor Co., Chicago Heights, Ill.	Parrett, H.	12	25	3-14		2800	5225		Wh.	60	Buda	4 Ver.	4½ x 5½	1000
95	Peoria Tractor Corp., Peoria, Ill.	Peoria, J.	12	25	3	26	3000	5100	1,985	Wh.	56	Clim.	4 Ver.	5 x 6½	800
96	Pioneer Tractor Co., Winona, Minn.	Pioneer, 18-36	18	36	4	28	4000	6100		Wh.	60	Own	4 Ver.	5½ x 6	750
97		Pioneer, 30	30	60	10	36	8000	24000		Wh.	96	Own	4 Ver.	7 x 8	650
98	Plow Man Tractor Co., Waterloo, Ia.	Plow Man, 15-30	15	30	3-4	30	3000	5100	1,895	Wh.	60	Buda	4 Ver.	4½ x 6	1000
99	Pope Mfg. Co., Watertown, S. D.	Dakota, 4	15	27	3	24	2000	5400	1,750	Wh.	42	Doman	4 Ver.	4½ x 6	800
100	Pt. Huron Eng. & T. Co., Pt. Huron, Mich.														
101															
102	Reed Fdy. & Mach. Co., Kalamazoo, Mich.	One-Man.	12	25	3	22-24		5000	1,685	Wh.	60	Wauk.	4 Ver.	4½ x 5½	1000
103	Rock Island Plow Co., Rock Island, Ill.	Heider, C.	12	20	3-14	24	2000	6000		Wh.	57	Wauk.	4 Ver.	4½ x 6½	750
104		Heider, D.	9	16	2-14	20	1500	4000		Wh.	57	Wauk.	4 Ver.	4½ x 5½	800
105															
106	Russell & Co., The, Massillon, Ohio														
107	Short Turn Trac. Co., Minneapolis, Minn.	Short Turn, D.	20	40	3	24		5000	1,500	Wh.	65		4 Ver.	4½ x 6	950
108	Stinson Trac. Co., Minneapolis, Minn.	Stinson, 18-36	18	36	4	28-30		7100	1,800	Wh.	60	Beav.	4 Ver.	4½ x 6	950
109															
110	Topp-Stewart Trac. Co., Clintonville, Wis.	Topp-Stewart, B.	20	35	3-5		5000	7500	3,000	Wh.	42	Wauk.	4 Ver.	4½ x 6½	900
111	Turner Mfg. Co., Pt. Washington, Wis.	Simplicity	14	25	3	24	2600	4300	1,675	Wh.	54	Buda	4 Ver.	4½ x 5½	1000
112															
113	U. S. Trac. & Mch. Co., Menasha, Wis.	Uncle Sam, B-19	20	30	3	28	3000	4250	2,300		50	Beav.	4 Ver.	4½ x 6	900
114															
115	Waterloo Gasoline Eng. Co., Waterloo, Ia.	Waterloo Boy, N.	12	25	3-14		2000	5900		Wh.	52	Own	2 Hor.	6½ x 7	750
116	Wetmore, H. A., Sioux City, Ia.	Wetmore	12	25	2	22	2900		1,385		48	Ruten.	4 Ver.	4½ x 5½	960
117	Wisconsin Farm Trac. Co., Sauk City, Wis.	Wisconsin, E.	16	30	3-4	28	3500	5440		Wh.	52		4 Ver.	5 x 6½	800
118															
119	Yuba Mfg. Co., Marysville, Calif.	Ball Tread	12	20	3-14		3500	6750	2,945	Cr.		Wauk.	4 Ver.	4½ x 6½	700
120		Ball Tread	20	35	5-6		5000	10100	4,465	Cr.		Wisc.	4 Ver.	5½ x 7	700

Motor Cultivators

115	Atlantic Mch. Mfg. Co., Cleveland, Ohio	Merry Garden					250		185						
116	Beeman Tractor Co., Minneapolis, Minn.	Beeman, F.	2	4	1-7	None	260	550	285	Wh.	24	Own	1 Ver.	3½ x 4½	850
117															
118	Elderfield Mechanics Co., Pt. Washington, N. Y.	Universal, 20	1	4	1		250	950	450		36	Own	1 Ver.	3½ x 5	1000
119	Midwest Engine Co., Indianapolis, Ind.	Utilitor	1½	3	1		150-200	750	345	Wh.	24	Own	1 Ver.	3½ x 4½	1200
120	Scientific Farming Mch., Minneapolis, Minn.	Princess Pat	12	25	2	24-26	2000	3500	1,750	Wh.	46	Buda	4 Ver.	4½ x 5½	1000

One-Horse Tractors

21	Atlantic Mch. & Mfg. Co., Cleveland, Ohio	Merry Garden					250	185							
122	Avery Co., Peoria, Ill.	Avery, C.					3450			Wh.	38	Own	4 Ver.	3 x 4	1200
123		Avery, 5-10 B.	5	10	2-12	22 x 32	800	2600		Wh.	38	Own	4 Ver.	3 x 4	1200
124	J. I. Case Plow Works, Racine, Wis.														
125	Detroit Culto-Tractor Corp., Detroit, Mich.	Detroit Culto, AA	9	16	2-14	20 x 28	1600	1800	775	Wh.	42	Own	2 Ver.	4 x 6	400
126	Emerson-Brantingham Co., Rockford, Ill.	E-B			None			3200		Wh.	42	Le Roi	4 Ver.	3½ x 4½	1000
127	Graham Bros., Evansville, Ind.	Graham	7½				1000			Wh.	42	Le Roi	4 Ver.	3½ x 4½	1200

Abbreviations: **Traction**—Wh., wheel; Cr., crawler; Ch. T., chain tread. **Engine**—Beav., Beaver; Veer., Veerac; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Man. Wisconsin; Hink., Hinkley. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G., gasoline; K., kerosene; D., distillate. **Carburetor**—Ray., Rayfield; King., King; Donaldson; Ben., Bennett; Holl., Holley; John., Johnson; Opt., Optional. **Magneto**—A-K., Atwater Kent; Sum., Sumter; Eise., Eisemann; Berl., Berling. **Clutch**—B. & B., Gearset type—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetary; Sl. J. C., sliding jaw clutch; C. M., constant mesh; Incl. Cl., Individual clutch. **Final** Shotwell-Johnson.

banquet at the Blackhawk hotel. M. E. Strieter served as toastmaster. There were talks by R. B. Lourie, vice-president of the John Deere Plow and Tractor Co.; C. A. Brownell, advertising manager of the Ford Motor Co., and a number of local bankers and business men. Mr. Brownell gave the principal address.

BELGIUM HOLDS TRACTOR TESTS

Paris, Oct. 6—Belgium's tractor trials were only partly competitive. An area of 2.47 acres had to be plowed in not more than four hours, all machines had to be subjected to a drawbar test and gasoline or kerosene consumption was carefully noted.

On the fuel consumption test the Fiat tractor, which was the only

Italian competitor present, came out the winner with 6.57 American gallons, the fuel used being commercial kerosene. The others in order of merit in the fuel tests were Case, 7.1 gal.; Austin, 7.7 gal.; Moline, 8.09 gal.; Whiting Bull, 9.3 gal.; Fordson, 9.4 gal.; Wallis, 9.5 gal.; Cleveland, 9.9 gal.; Titan, 10.3 gal.; Advance, 12.3 gal.; National, 12.4 gal.

and Their Technical Specifications

These tables are revised and brought up to date monthly

Line No.	Fuel	Make and size of carburetor	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended plowing speed	Final drive	Drive	Furrow wheel	Line No.
75	K	3/8-King.	Ben.	A-K	Own	Own	Sl. G.	Chand.	Own	Own	Own	12 1/4	1200	1 1/4-4	4	1 1/4-4	2 1/2	Ch.	Op.		75
76	G-K-D	-Ens.	Ben.	Dixie	Own	Own	Sl. G.	B. & L.	Own	Own	Own	18	623			1 1/4-4	2 1/2	Ch.	In.		76
77	G-K-D	-Own	Ben.	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	18	575			2 1/4-2 3/4	2 1/2	Ch.			77
78	G-K-D	-Own	Ben.	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	18	575			2 1/4-2 3/4	2 1/2	Ch.			78
79	K	1 1/2-Own	Ben.	K-W	Own	Covert	Sel.	McCord	Own	Hyatt	Hyatt	10	1000	2600	3	1 1/4-5	2 1/2	I. G.	In.	No	79
80	K	2 -Scheb.	Ben.	Bosch	Own	Own	Sl. G.	Own	Hyatt	Hyatt	Hyatt	11 1/2	700		3	2 1/2-3 1/2	3	S. G.			80
81	K	1 1/2-King.	Ben.	Own	Own	Own	Own	Modine	Hyatt	Hyatt	Hyatt	7 x 11	750	2125	1	2-2 3/4	2 1/2			Yes	81
82	K	-King.	Ben.	Own	Own	Own	Own	Hopper	Hyatt	Own	Own	10	1000	2600	1	1 1/4-2 1/4	2 1/2			Yes	82
83								Type													83
84	G-K-D	1 1/2-King.	Ben.	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Timk.	Hyatt	18	475	2200	2	1 1/4-2 1/4	2 1/2	G	In.		84
85	G-K	1 1/2-Strom.	Ben.	Dixie	Own	Own	Sl. G.	S-J	Hyatt	Own	Own	12	900	2825	2	2 1/4-5	2 1/2	S. G.	In.	Yes	85
86	G-K	1 1/2-Holl.	Ben.	Bosch	B. & B.	Own	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	16	650	2700	2	2.2-2.9	2.9	S. G.	In.	Yes	86
87	G-K	1 1/2-Holl.	Ben.	K-W	Own	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	17	528	2350	2	2-2.75	2 3/4	S. G.	In.		87
88	G-K	2 -King.	Ben.	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	20	600	3150	2	1.4-2	2	S. G.	Op.		88
89	G-K	2 1/2-King.	Ben.	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	23	535	3200	1	2	2	S. G.	Op.		89
90	G-K	3 -King.	Ben.	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	23	535	3200	1	2	2	S. G.	Op.		90
91	G	1 1/2-Holl.	Ben.	Remy	B. & B.	Own	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	9		2600	1	1 1/2-3 1/2	3 1/4	G.	In.	Yes	91
92	K	1 1/4-King.	Own	Eise.	Own	Own	Sl. G.	Perfex	Hyatt	Hyatt	Hyatt	12	1000	3141	3	1.80-3.76		I. G.	In.		92
93	K	1 1/4-Strom.	Ben.	Eise.	Own	Nutt.	Sl. G.	Eureka	Hyatt		Hyatt	14	650	2500	2	2 1/4-4	2 1/2	I. G.		Yes	93
94	G-K	1 1/2-King.	Ben.	K-W	Own	Own	Sl. G.	S-J	Timk.	Timk.	Timk.	14	750		3	1 1/2-4	2 1/2	S. G.			94
95	G-K	2 -King.	Ben.	K-W	Own	Own	Sl. G.	S-J	Own	Own	Own	17 1/2	650		3	1 1/2-4 1/4	2 1/2				95
96	G-K	1 1/4-Strom.	Len.	Dixie	Twin	Foote	Sl. G.	Perfex	Hyatt	Hyatt	Hyatt	14	500	2200	2	2-3	2 1/2				96
97	K	1 1/4-Linga	John.	K-W	Bier.	Own	Sl. G.	S-J	Own	Own	Own	14	800	2500	1	3	3	Ch.		Yes	97
98																					98
99	G-K	1 1/4-Ben.	Ben.	Dixie	Bier.	Own	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	14 1/2	2600	703	2 1/2-3 1/2	1-4	2 1/2	B. G.	In.	Yes	99
100	G-K	1 1/2-King.	Ben.	Dixie	Own	Own	Fr.	Perfex	U. S.	Own	Own	14	600	2200	7	1-4	2 1/2	B. G.		Yes	100
101	G-K	1-King.	Ben.	Dixie	Own	Own	Fr.	Perfex	U. S.	Own	Own	12	700	2200	7	1-5	1 1/4	B. G.	Op.	Yes	101
102																					102
103													950								103
104	G-K	1 1/2-Opt.	Opt.	Dixie	Own	Own	Sel.	Splitex	Own	Own	Own	18	700		2	2-3	2 1/2-3	I. G.		Yes	104
105													490								105
106	K	1 1/2-King.	Own	Dixie	Own	Own	Sl. G.	Todd	Hyatt	Hyatt	Own	12	950		1	2 1/2-3	3	S. G.			106
107	G	1 1/4-Strom.	Ben.	Eise.	B. & B.	Own	Sel.	Bremer	Hyatt	N. D.	N. D.	12	900	2600	3	1 1/4-4 1/2	2 1/2	I. G.			107
108	G-K	1 1/4-King.	Ben.	Dixie	Own	Own	Own	Perfex	Hyatt	Own	Own	14	600	600	2-2 1/2	1 1/4-3	2 1/2			Yes	108
109	K	1 1/2-Ben.	Ben.	Dixie	Twin	Nutt.	Sl. G.	Perfex	Timk.	Timk.	Timk.	11	900	2600	2.6-3.8	2-4	2.6	S. G.	In.	Yes	109
110	K	1 1/4-Scheb.	Ben.	Dixie	Own	Own	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	14	750	2750	2 1/4-3	2 1/4-3	2 1/4-3	S. G.	In.	Yes	110
111	G	1 1/4-King.	Ben.	Dixie	Full.	Fuller	Sl. G.	Ideal	Hyatt	Hyatt	Hyatt	12	900		3	2-5	3	I. G.	In.	Yes	111
112	K	1 1/2-Strom.	Ben.	Eise.	B. & B.	Foote	Sl. G.	Perfex	Hyatt	Hyatt	Hyatt	16	600	2600	2	1 1/2-4	2 1/2	S. G.	In.		112
113	D	1 1/4-Ens.	Donald	Bosch	B. & B.	Own	Sl. G.	Own	Hyatt	Hyatt	Hyatt	12	700	2200	3	1.5-4	2.08	B. P.			113
114	D	-Strom.	Donald	Bosch	Para.	Own	Sl. G.	Own	Hyatt	Hyatt	Hyatt	10-14	700	1835	2	2.06-3.28	2.06	I. G.			114

Motor Cultivators

115																					115
116	G	3/4-King.	Donald.	Heinze	Own	Own	Sl. G.	S-J	None	None	None	4 1/2	850	900	1	3/4-3	2	G.		Yes	116
117	G	3/4-Zen.		{A-K Berl}	Own	Own	Sl. G.	Mersick				8	1000		1	1-4	2	None		Yes	117
118																					118
119	G	3/4-King.	Own	Eise.	Own	Own	Modine	Fafair.				4	1200	1200	1	2-2 1/2	2 1/4	B. G.	In.		119
120	K	1 1/4-Ben.	Ben.	Dixie	B. & B.	Own	Sl. G.	S-J	Hyatt	Hyatt	Hyatt	12	1000	3100	2	2 1/2-4 1/2	2	I. G.	In.	Yes	120

One-Horse Tractors

121																					121
122	G-K	3/4-King.		K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Own	12	780	2450	3	1 1/2-4 1/4	2 1/2	S. G.	Op.		122
123	G-K	3/4-King.		K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Own	12	780	2450	3	1 1/2-4 1/4	2 1/2	S. G.	Op.		123
124																					124
125	G	1 1/4-Strom.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt	Own	Own	8	855	1800	2	1-3	2 1/4	B. G.	In.		125
126	G	-Holl.	Ben.	Dixie	Own	None	None	Perfex	Hyatt	Own	Hyatt	7 1/2	995		1-5	1 1/2-3 1/2	None				126
127	G	3/4-King.	Ben.	Dixie	Own	Own	Sl. G.	S-J	Hyatt		Hyatt				2	3/4-3	2 1/4	S. G.	In.		127

Manufacturers: Auto., Automatic; Weid., Weidley; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth; Spec., Special; Wisc., Wisc.; Zen., Zenith; Car., Carter. Air Cleaner—Donal. Borg & Beck; Bier., Bierman; Spec., special; Full., Fuller; Twin, Twin Disk; Hill., Hilliard; Detf., Detlaff; Para., Paragon. Gearset—B. & S., Brown & Sharpe; Nutt., Nuttall. Drive—S. G., spur gear; G., gear; Ch., chain; R. P., roller pinion; I. G., internal gear; B. P., bull pinion. Drive—Op., open; In., inclosed. Radiator—Chand., Chandler; S-J.,

The drawbar test consisted of hauling a trailer loaded with 4 1/2 tons of beetroots up an 8 per cent gradient. The Fiat tractor made the fastest time in this, and the others which succeeded in accomplishing the whole of the climb were Cleveland, Moline, Saunderson and Titan.

A technical committee was awarded the task of giving points for mechan-

ical construction and regularity of operation. The highest number of points under this head went to the Fiat with 94. The lowest number awarded to any machine was 63.

GOODYEAR INCREASES STOCK

Akron, O., Nov. 24—Authorization of Goodyear Tire & Rubber Co., stockholders for an increase in the capital stock to \$200,000,000, half common

and half preferred, was given last week. The present outstanding preferred is called in and \$40,000,000 of the new stock issued, practically all of which has been subscribed by present stockholders, with foreign stockholders taking up the remainder which was less than \$500,000. Employees of the company to the number of 17,101, constituting two-thirds of the payroll, took \$7,364,700 worth of the stock.

Tire and Rim Sizes

Motor Maintenance Data Cost Sheet No. 64

One of a series of weekly pages of information valuable to service men and dealer—Save this page

1914 Cars (Continued)

CAR AND MODEL	Make of Tire	Size of Tire	Style of Bead	Type of Rim	Make of Rim
Mercer, 35-M.		35x4½		Q. D. C.	
Mercer, 35-H & O.		34x4		Q. D. C.	
Meteor, M-36 & F-40		34x3½			
Meteor, W6-45		35x4			
Metropol, C.		33x4			
Metz,		30x3		Clincher	Mott
Mitchell, A-40, 50 & A5-60.		36x4½	S. S.		Baker with beads Firestone Baker with beads Firestone Firestone
Mitchell, A7-60.		37x4	S. S.		
Moline-Knight, B.	Goodrich. Firestone.	36x4½	S. S.	Demountable.	
Monarch, 4.		32x3½			
Mondex-Magic, 6-40.		36x4½			
Mondex-Magic, 6-60.		37x5			
Monitor, C.	U. S.	32x3½	S. S.	Demountable.	Kelsey
Monitor, M.	U. S.	33x4	S. S.	Demountable.	Kelsey
Moon, 42.		34x4		S. S.	Baker
Moon, 6-50.		35x4½		S. S.	Baker
Morse, D.		36x4½			
Moyer, E.		34x4		Q. D. C.	
Moyer, G.		35x4½		Q. D. C.	
National, 6-W.	Opt.	36x4½	Clincher.	Q. D.	Firestone
Norwalk, D.		34x4½			
Norwalk, C.		37x4			
Oakland, 36.	Goodyear.	39x5			
Oakland, M-48.		34x3½	Clincher.	Demountable.	Baker
Ohio.		34x4		Demountable.	
Oldsmobile, 54.	Goodyear.	34x3½	S. S.	Demountable.	Baker
Overland, 79.		36x5		S. S.	Baker
		33x4		No. 50-D, 2-D.	Baker
Packard, 238 & 448.	Goodyear.	36x4½	Clincher.	Reversible.	
		37x5		Q. D. D.	Firestone
Paige, 25.		32x3½		Demountable.	Goodyear
Paige, 36.		34x4		Demountable.	Goodrich Diamond Goodyear
Palmer-Singer.		36x4½			
Partin-Palmer, 38.		32x3½		S. S.	
Paterson, 53.		32x3½		Demountable.	
Pathfinder.		35x4½		Q. D. Dem.	
		34x4½			
		35x5			
Peerless, 38-6 & 48-6.		36x4½		Q. D.	Firestone
Peerless, 60-6.		38x5½		Q. D.	Firestone
Pierce-Arrow, 38-C2.		36x4½		Q. D. C.	Goodyear
Pierce-Arrow, 48-B2.		37x5		Q. D. C.	Goodyear
Pierce-Arrow, 66-A2.		38x5½		Q. D. C.	Goodyear
Pilot, 50-60.		37x4½		S. S.	Stanweld
Pope-Hartford, 35.		36x4½			
Pratt, 4-50.		36x4		Demountable.	
Premier, A.	Opt.	36x4½	Opt.	S. S.	Firestone
		34x4			
Pullman, 4-36.		34x4		Q. D. R.	Universal
Pullman, 4-44.		36x4		Q. D. R.	Universal
Pullman, 6-46.		36x4½		Q. D. R.	Wire Wheel
Pullman, 6-66.		37x5			
Rayfield, D.		36x4½			
Read, 30.		32x3½			
Regal, T N & N C.		32x3½			
Regal, C.		34x4			
Reo, R & S.		34x4	S. S.	Demountable.	Stanweld
Republic, E.		36x4½		S. S.	Stanweld
Richmond.		34x4			
Saxon, A.		28x3		Clincher.	Kelsey
Selden, 49.		36x4			
S. G. V.		35x4½		Q. D. C.	
Simplex, 38.		35x5			Firestone

ABBREVIATIONS:

S. S.—Straight Side. Q. D. C.—Quick Demountable Clincher. Dem.—Demountable. Q. D. D.—Quick Demountable Detachable.

Among the Makers and Dealers

Short Trade Notes

Metz to Represent Burd in Iowa—W. H. Metz, former representative of the Burd High Compression Ring Co. in the Detroit district, has been appointed district agent for the company in Iowa, with headquarters in Des Moines.

Crane Heads Indianapolis Marmon Sales—George A. Crane, for six years manager of the Chicago branch of the Garford Motor Truck Co., has been appointed manager of the Indianapolis branch of the Nordyke & Marmon Co.

Sewell Opens New Branches—Branches in Dallas, Omaha, Salt Lake City, Los Angeles, San Francisco, Portland, Seattle and Porto Rico have been recently opened by the Sewell Cushion Wheel Co., Detroit. This concern has now 35 distributing branches.

Kentucky Airplane Firm Is Formed—Articles of incorporation have been filed with the county clerk by the Kentucky Airplane & Supply Co., which has a capital of \$50,000. Stanley E. Hubbard, George D. Mattingly, W. E. Mattingly and L. H. Sackett are the incorporators.

Eastern G. M. C. Plant Nearly Ready—The dismantling of the International Arms & Fuse Co. plant at Bloomfield, N. J., and the installation of machinery for the manufacture of automobiles by the General Motors Corp. are progressing rapidly. At the plant it was announced that the work of preparing the factory for production was being rushed to completion and that manufacturing would be started within a few weeks.

Goodyear Calls in War Stock—The Goodyear Tire & Rubber Co. has called in its entire \$15,000,000 second preferred stock, issued a year and a half ago as part of the war financing program. The stock is to be taken up Nov. 1 at 105 plus 2 per cent quarterly dividend payable on that date. Under the conditions named at the time of issuance the stock, which paid 8 per cent, could be recalled on or before February, 1921, at 105.

The Goodyear company has an authorized capital of \$100,000,000, of which \$50,000 is to be common, \$25,000,000 first preferred and \$25,000,000 second preferred. Of this, however, only about \$20,000,000 common, \$23,000,000 first preferred and the present issue under discussion of \$15,000,000 second preferred is outstanding.

Elgin Keeps Van Sicklen Plant—Citizens of Elgin, Ill., have agreed to give the Van Sicklen Speedometer Co. a tract of land costing \$50,000, and also finance a \$250,000 home-building corporation which will assist employees to own a dwelling in consideration of the company enlarging the plant to the extent of \$750,000. The company has threatened to move unless the city came to its relief. Employees could not be obtained, due to lack of houses. It was regarded as unwise to expand and provide quarters for more employees unless homes were available for their shelter. The increase in the capacity of the plant means many hundred additional employees and the industry will

prove a valuable one for the city. The promptitude with which the terms of the company's offer were accepted indicates the importance of the industry. When the plans of the Van Sicklen corporation are worked out to the fullest completion, the value of the plant will be in the neighborhood of \$3,000,000.

Columbus Parts Co. Expands—Directors of the Columbus Auto Parts Co., Columbus, have voted to increase the authorized capital from \$150,000 to \$300,000 in order to provide for additions. It has been decided to build a new plant and a selection of a location will soon be made. The concern now employs 200 men and it is expected to double that number. The concern now makes a full line of automotive hardware. Charles J. Krag is president; A. J. Pembroke and J. J. Stoddart, vice-presidents; R. E. Klages, secretary, treasurer and general manager.

To Make Passenger Car—The New York Air Brake Co., which entered the truck manufacturing field a few weeks ago, now plans to make passenger cars. The first truck was completed a few weeks ago and the factory is now turning them out in small quantities. Production will be increased gradually and it is expected that the production will be brought up to an annual output of 20,000. It is announced that the manufacture of passenger cars will be started immediately. The new job will contain several new patented features, it is said, that are expected to achieve immediate popularity for it.

Chrysler Out of G. M. C.—Walter P. Chrysler, vice president of General Motors disagreement with Pres. W. C. Durant Corp., resigned Nov. 1 as the result of a over policies. Chrysler recently confirmed the report of his resignation, but declined to make any statement regarding the events which led up to it. He denied, however, that his action was precipitate, and said he had tendered his resignation several days prior to Nov. 1. Reports were to the effect that his resignation, effective immediately, followed a personal disagreement with Durant. Efforts to secure a statement from the general offices of the corporation at Detroit were futile, company officials refusing to make any statement regarding a break between Durant and Chrysler.

Standard Bearing Co. in Combine—The Standard Roller Bearing Co. and all the Marlin-Rockwell properties have been combined into a new operating organization to be known as the Standard Steel and Bearings, Inc., according to a recent announcement.

The constituent plants are Standard Roller Bearing Co., Philadelphia; Braeburn Steel Co., Pittsburgh; Rockwell Drake Bearings Division, Plainville, Conn.; Willow Street and Hamden Divisions, New Haven, Conn., and the Norwich Division, Norwich, Conn. The Marlin-Rockwell manufactures to be centralized in the new company are: Standard Roller Bearing annular ball bearings, single and double; Standard Roller Bear-

ing taper roller bearings; Standard Roller Bearing steel balls, and the Braeburn Steel electric furnace, high speed and crucible tool steels.

It is announced that no changes are implied either as to policy or executive and operating personnel. The general sales and accounting departments are to be combined in the executive offices, 347 Madison avenue, New York.

Fisher Body to Open in Cleveland—The Fisher Body Co. will have a six-story plant in Cleveland. This marks the entrance of the General Motors Corp. in Cleveland. The plant, containing 1,500,000 feet of floor space and employing 7500 men, will be opened on completion of the building which already has been started. The Fisher Body Co., which started in Detroit 11 years ago with a capital of \$31,000 and whose gross business the first year was \$142,000, will do a \$50,000,000 business this year, according to officials of the company, which now operates 22 plants in Detroit and one in Walkersville, Ont. The new building to be erected will be modern in every respect and equipment for the plant already is being manufactured in Detroit. The local plant will begin business with orders in excess of \$20,000,000.

Ajax Builds for Western Trade—New factories to handle the Western trade will be built at Jackson, Mich., by the Ajax Rubber Co., according to an announcement made here today by Horace DeLisser, president of the company. A tract of 110 acres has been purchased there, on which plants costing approximately \$2,500,000 will be erected, it was said. The present factories of the company are at Trenton, N. J., and will be continued to handle the Eastern and Southern business. The proposed plant was designed to double the Ajax production.

In connection with the factory plan, President DeLisser stated that arrangements had been completed with the Chamber of Commerce of Jackson for the construction of 600 new houses which will be reserved for employees. Work will be started on this project at once so that the houses may be occupied when the plant is completed.

Ford Abandons Plan for Plant—Ford Motor Co. officials announced that the profiteering attitude assumed by farmers seeking to sell property as a site for an auxiliary automobile and tractor plant at Mt. Clemens, Mich., had resulted in cancellation of negotiations. Farmers demanded \$200 an acre for pasture land. The plans contemplated the purchase of approximately 5000 acres and the erection of a plant to cost \$500,000 and to be operated by hydro-electric power from the Clinton river. Another plan which is being pushed purposes operation of the plant six months each year, allowing the workmen to go into the fields after April 1 and labor on the farms and the use of the large dam only during the period of operation, allowing the river to resume its normal course during the remainder and giving the farmers opportunity for use of the pasture lands.

From the Four Winds

Glimpses at the World of Motordom

Pennsylvania issues many licenses—More applications for motor car licenses have been filed at the state highway department in Pennsylvania than ever before at this season of the year. Blanks are being printed but not fast enough and applications in hundreds of instances are being made on business letterheads. Most of the applications ask for special numbers.

Celebrate completion of road—Nearly 1000 motor cars formed a procession over the 25-mile concrete road recently completed through Delaware and Chester counties, Pennsylvania. The road forms an important link in the state highway system and the parade officially opened the thoroughfare. More than 250 state and highway officials participated in the celebration. Farmhouses along the route were decorated for the occasion and groups cheered the party on its trip. The road, which marks a new era in road-building, is known as Route 131. It affords a quick and easy route for Philadelphia, New York, Baltimore and Washington.

Detroit Starts Building—Building permits aggregating \$4,034,350, which includes permits for 692 new buildings, the majority residences and apartments, evinces the determination of Detroit to overcome the critical situation as regards housing. All agencies are at work in the effort to provide suitable homes for the hundreds who now are huddled together in cramped quarters and many of them living in public buildings and lodge halls. The lack of accommodations is proving a

Coming Motor Events

RACES

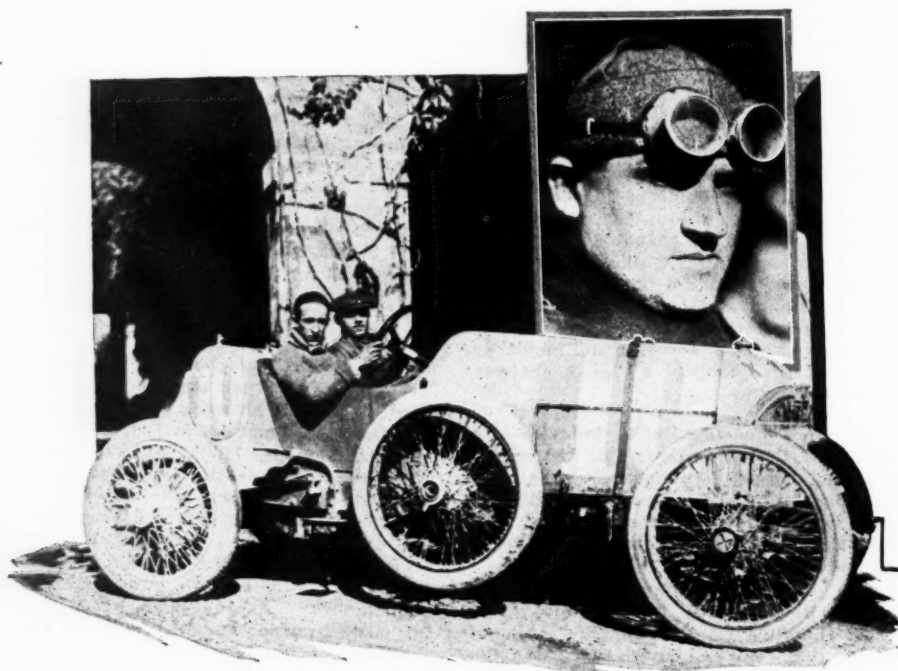
Los Angeles, Cal.	Ascot Speedway	Nov. 27
Los Angeles, Cal.	Ascot Speedway	Nov. 30

SHOWS

Chicago	Motor Transport Corps	Dec. 4, 5 and 6
Paris, France	Aeronautic Industry Show	Dec. 19 and Jan. 4
New York	N. A. C. C.	Jan. 3 to 10
Chicago	Aeronautic Show	Jan. 8 to 14
Montreal, Que.	Automobile Show	Jan. 15
Philadelphia	Automobile Show	Jan. 10-17
Philadelphia	Automobile Show	Jan. 17-24
Cleveland, Ohio	Automobile Show	Jan. 17 to 24
Hartford, Conn.	Automobile Show	Jan. 17-24
Spokane, Wash.	Automobile Show	Jan. 21 to 25
Chicago	N. A. C. C.	Jan. 24 to 31
Toledo, Ohio	Automobile Show	Feb. 2-7
Brussels, Belgium	Motor Show	January
Wichita Kan.	Wichita Thresher Tractor Club	Feb. 9 to 11
Kansas City, Mo.	Kansas City Tractor Club	Feb. 9 to 14
Louisville, Ky.	Automobile Show	Feb. 2-7
St. Louis	Automobile Show	Feb. 15-20
Montreal, Quebec	Dealers' Show	February 16
Buffalo, N. Y.	Dealers' Show	February
Lyons	Automobile Show	March 1 to 8
Boston, Mass.	Automobile Show	March 13 to 20
New Orleans, La.	Fashion Show	March
Jersey City, N. J.	Automobile Show	March
Little Rock, Ark.	Automobile Show	Nov. 15
Wilkes-Barre Pa.	Automobile Show	Mar. 15-22

CONVENTION

Cleveland, Ohio	Ohio Dealers' Convention	Dec. 3, 4, 5
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Italy's first post-war race winners

Sig. Ascari (in panel) and Sig. Mergalli (in car), who finished first and second in the first race held in Europe since 1914. The race was held near Bercetti, Italy

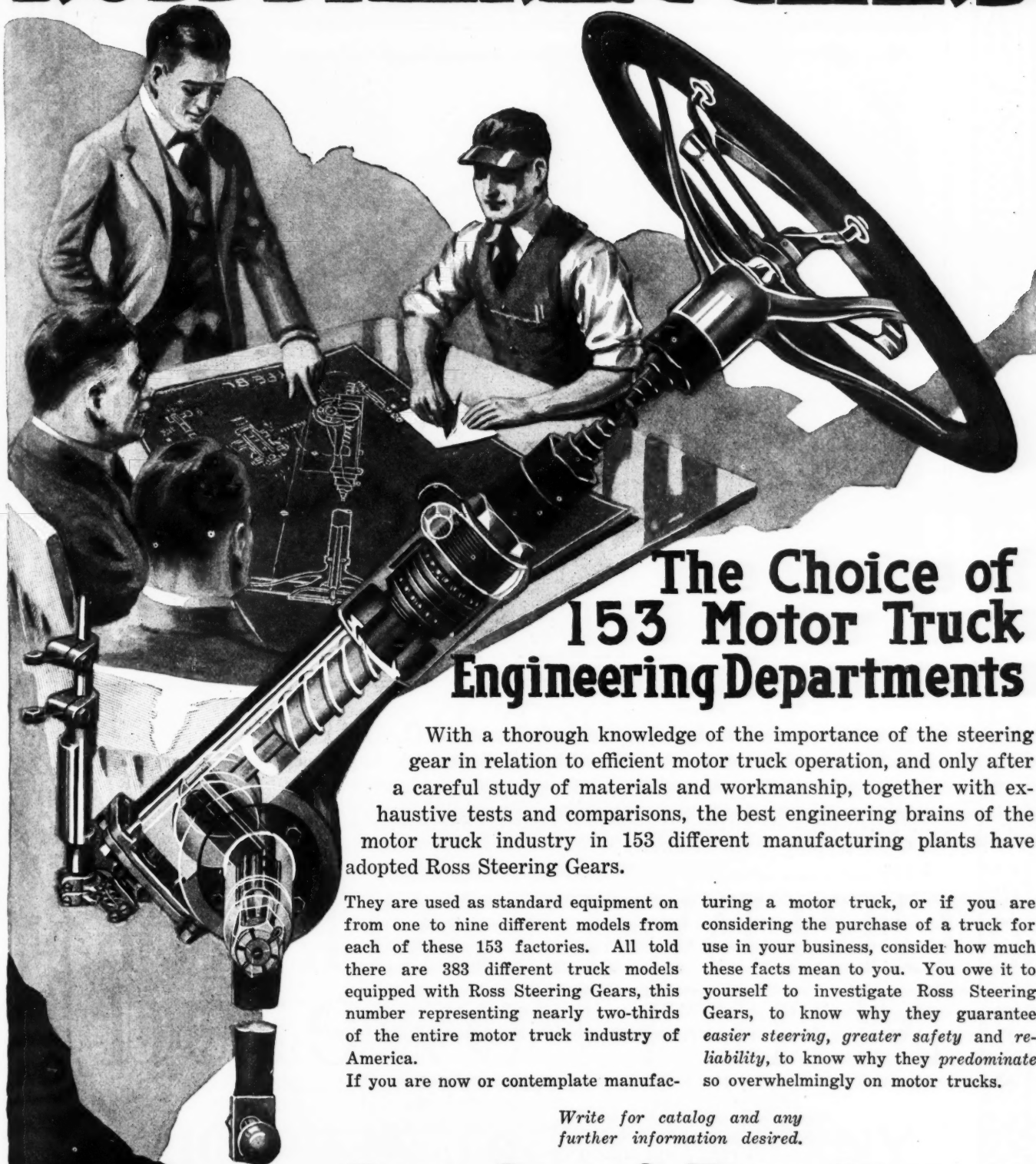
serious handicap to the automobile industry, factories being unable to get even common labor sufficient to man the plants simply because of lack of living quarters. The sound of saw, hammer and trowel are heard throughout the city and no time is being lost in construction once the permit has been secured.

Ohio Dealers Meet at Lima—Secretary Victor Moon of the Ohio Automobile Trade Association has been busy looking after organizations throughout the state. A meeting was held Nov. 19, at Lima, to organize the Allen County Automobile Trade Association.

Milwaukee Truck Dealers Organize—The organization of a motor truck distributor and dealer division of the Milwaukee Automobile Dealers, Inc., was planned at a conference of members of the commercial car industry of Milwaukee called by M. D. Newald, Steward distributor. While the present membership of the M. A. D. takes in the truck men, it is proposed to organize them into a distinct association.

Milwaukee to Build Show Hall—The construction of a great exposition hall at State Fair Park, Milwaukee, to accommodate exhibits of motor trucks, trailers, tractors, farm lighting plants, etc., leaving the present Motor Hall exclusively for passenger cars, is proposed by the state fair division of the Wisconsin Department of Agriculture.

ROSS STEERING GEARS



The Choice of 153 Motor Truck Engineering Departments

With a thorough knowledge of the importance of the steering gear in relation to efficient motor truck operation, and only after a careful study of materials and workmanship, together with exhaustive tests and comparisons, the best engineering brains of the motor truck industry in 153 different manufacturing plants have adopted Ross Steering Gears.

They are used as standard equipment on from one to nine different models from each of these 153 factories. All told there are 383 different truck models equipped with Ross Steering Gears, this number representing nearly two-thirds of the entire motor truck industry of America.

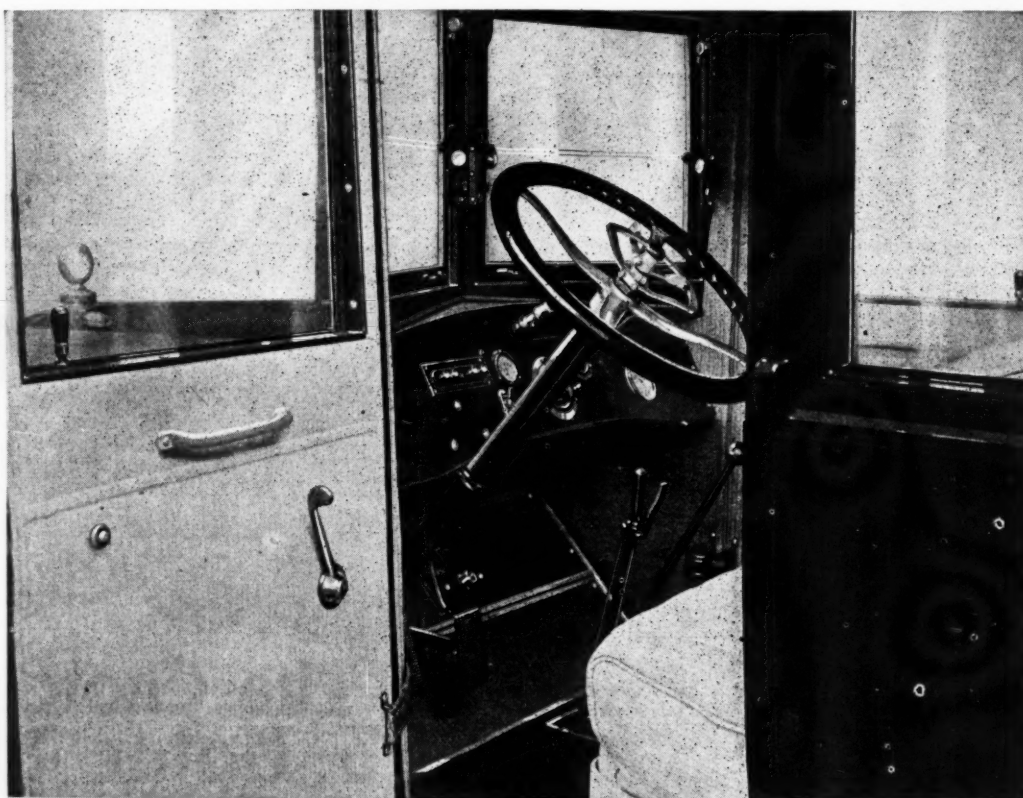
If you are now or contemplate manufac-

turing a motor truck, or if you are considering the purchase of a truck for use in your business, consider how much these facts mean to you. You owe it to yourself to investigate Ross Steering Gears, to know why they guarantee *easier steering, greater safety and reliability*, to know why they predominate so overwhelmingly on motor trucks.

Write for catalog and any further information desired.

ROSS GEAR & TOOL COMPANY
400 Heath Street, Lafayette, Indiana, U.S.A.

The Steering Gears that Predominate on Motor Trucks



INTERIOR DESIGN

The interior design of the new Crow-Elkhart Sedan fitly supplements the grace and smartness of its external beauty. There is a sense of snugness in the Sedan, yet ample room for comfort. The wide windows afford the fullest range of vision, the richly upholstered seats are pitched at exactly the correct angle for riding ease. One may *drive* a Crow-Elkhart Sedan, or merely *ride*, for hours without the slightest restiveness or fatigue.

CROW-ELKHART Multi-Powered

Model H-57, Seven Pass. Sedan. Six Cyl.	\$2395
Model H-56, Five Pass. Touring Car. Six Cyl.	1545
Model L-55, Five Pass. Touring Car. Six Cyl.	1295

Write for catalog containing full information

CROW-ELKHART MOTOR CORPORATION, Dept. 101, Elkhart, Indiana.

Export Dept. Broadway at 53rd St., New York City, U. S. A.

DEALERS will instantly recognize the unusual profit-proposition that the representation of the Crow-Elkhart Multi-Powered Line affords. Write today, or wire, for particulars about our attractive dealer franchise.

MICHELIN

AN OPPORTUNITY

Notwithstanding the popularity of Michelin Tires, there are some towns where dealers can still secure this valuable account.

In these towns we offer the following:

1st—A thoroughly tested cord tire, made by the oldest pneumatic tire maker in the world.

2nd—A fabric tire of unsurpassed quality sold at a moderate price.

3rd—The only ring-shaped tube on the market—a tube that sells itself.

4th—One of the biggest and most impressive tire and tube advertising campaigns ever conducted.

5th—Special sales helps for individual dealers.



We invite you to write us now

MICHELIN TIRE COMPANY

Milltown, New Jersey

In beauty, Hayes Wire Wheels add to any car a percentage too great to be overlooked by those who take pride in car-smartness.

So it was to be expected that the first preference for wire wheels would be shown by owners of the costlier types.

But no less astonishing has been the general vogue of Hayes Wire Wheels among cars of all types and makes.

A great majority of car manufacturers specify Hayes as their wire wheel equipment.

Furthermore, literally thousands of owners have elected to change over to Hayes Wire Wheels.

These simple facts constitute the reasons why Hayes Wire Wheel dealerships are being rapidly taken by the better accessory and special agencies. There may be an exceptional opportunity in your city

Wire Wheel Division

Hayes Wheel Company, Jackson, Mich.

World's Largest Builders of Wheels—Wire, Wood, Steel

Sales and Service Stations:

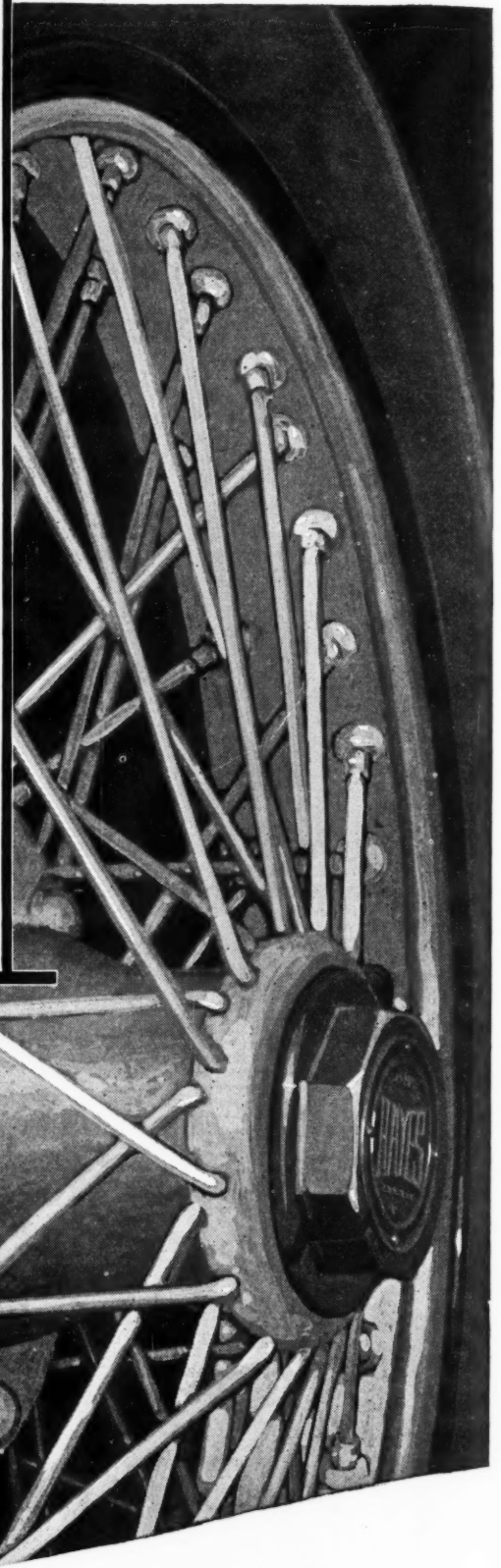
Brooklyn Service Co.
1194 Bedford Ave., Brooklyn, N. Y.
Hayes Wire Wheel Sales Corp.
842-7th Ave. & 146 W. 55th St., N.Y.C.
Evans & Lawrie Co.
1090-2 Commonwealth Ave., Boston
Samuel Scott
2038 Ranstead St., Philadelphia, Pa.
Miller & Woodward
3751 Bigelow Blvd., Pittsburg, Pa.
Brigman Motor Company
491 Whitehall St., Atlanta, Ga.
Siggins Sales Company
106-8 E. Milwaukee Ave., Detroit
Chicago Wheel & Rim Co.
2010-12 Wabash Ave., Chicago, Ill.

Auto-Marine Service Co.
1027 Nicollet Ave., Minneapolis, Minn.
Interstate Auto Company
206-8 E. Superior St., Duluth, Minn.
Motors, Equipment & Tractor Co.
1310 S. Grand Ave., Los Angeles, Cal.
C. H. Carter
724 Van Ness Ave., San Francisco, Cal.
Automotive Supply Company
1558 Broadway, Denver, Colo.
The Three Captains Co.
700 S. Ervay St., Dallas, Texas
Wire Wheel Distributing Co.
435 Stark St., Portland, Ore.
Motor Products Sales Co.
806 E. Pike St., Seattle, Wash.



HAYES

Wire Wheels





LAFAYETTE

We are pleased to announce
the following personnel:

C. W. NASH - - - *President*

JAMES J. STORROW - *Chairman*

D. McCALL WHITE, *Vice President*

E. C. HOWARD - *Vice President*

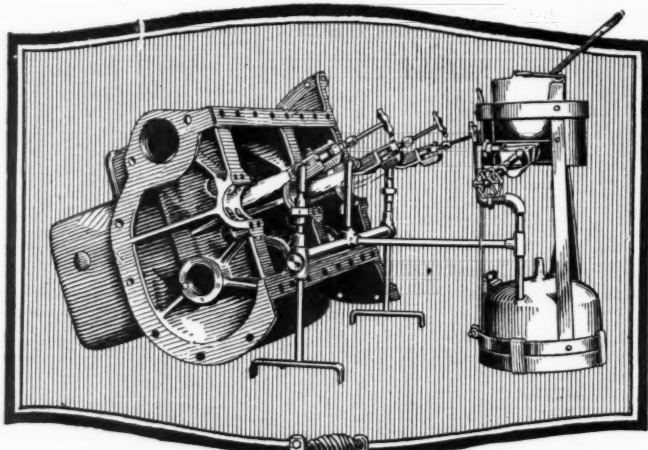
M. J. MOORE, *Secretary-Treasurer*

LAFAYETTE MOTORS COMPANY
at *Mars Hill*, INDIANAPOLIS

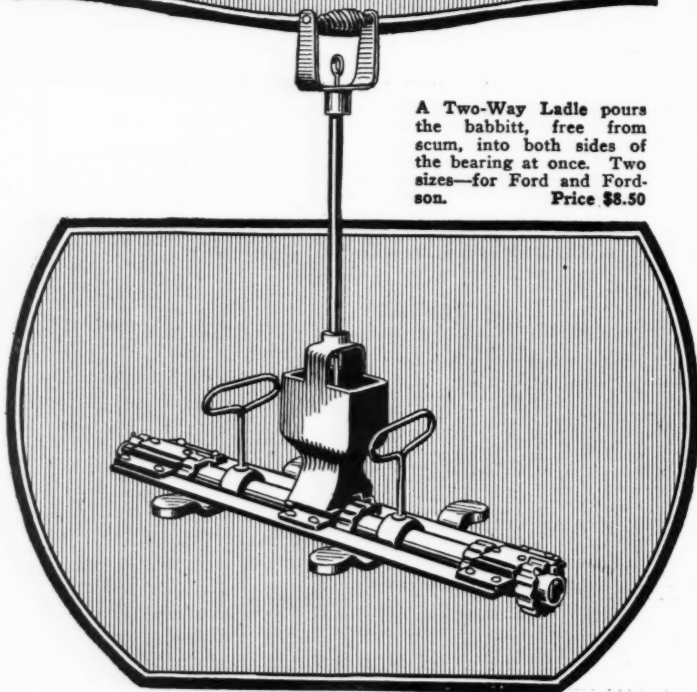


A new line of Profitmaking machines for Fords for every repairman

The Four-Way Torch and Babbitt Pot melts the new metal, cleans and pre-heats the block. Price \$48.50



A Two-Way Ladle pours the babbitt, free from scum, into both sides of the bearing at once. Two sizes—for Ford and Fordson. Price \$8.50



With the Hempy-Cooper Babbitting Jig you cast a perfect set of bearings every time. Sold only with the Boring Machine.

MANY a repair shop, otherwise well equipped, passes all engine-bearing replacements along to the factory. Result—several weeks' delay to an impatient owner, and a lost chance for profits.

See how easy it is to put in a set of Ford or Fordson crankshaft bearings when you have the set of tools shown here.

Melt out the old babbitt and heat the new metal with the Hempy-Cooper Four-Way Torch. Then turn the cylinder-block bottom up, and put on the Babbitting Jig. No fussing; the jib slips easily into place and locks securely. Then fill the Two-Way Ladle and pour each bearing from both sides at once—the correct way that makes sure of a good job.

As soon as the bearings have cooled, put on the Hempy-Cooper Boring Machine. A lug on each end goes into the camshaft bearings, making the center distances accurate for the timing gears. Put on new bearing caps, and turn the handle. All three bearings are bored at once in perfect alignment and are ready for burning in.

The

FAIRBANKS

MILL, MINE & RAILWAY SUPPLIES - SCALES - VALVES - POWER TRANSMISSION - MACHINE TOOLS

and Fordsons

The crankshaft and new bearing caps are next put on. They are screwed down tight, without oil. The cylinder block is placed in an American Junior Burning-in Machine, which rotates the crankshaft at moderate speed. After two or three minutes the friction and heat against the alloy-steel shaft push the yielding babbitt away from the high spots and the bearing surface shows the high polish of a perfectly-finished bearing.

Result? A saving of 5 to 7 hours—time valuable to the owner, whose car is out of service; time for which you pay in labor costs. When a motor comes in to be overhauled you can point to this set of machines and say, "I have The Fairbanks Company's equipment that makes a set of crankshaft bearings just like the original factory set. Better have yours renewed while the engine is down—it will not delay the completion of the job."

Up-to-date equipment of labor-saving machinery insures confidence in your repair shop. These devices and many others come to you under "The Fairbanks Company O. K."—a guarantee known and respected by every user of mechanical equipment and supplies.

THE FAIRBANKS COMPANY

Administrative Offices, NEW YORK

Branch Houses

Albany
Baltimore
Birmingham
Boston
Bridgeport
Buffalo
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Detroit
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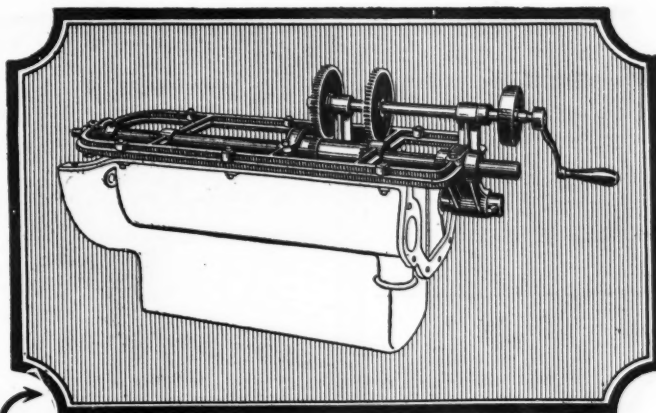
Providence
Rochester
Scranton
St. Louis
Syracuse
Utica
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Havana, Cuba; London, England; Birmingham, England;
Glasgow, Scotland; Paris, France.

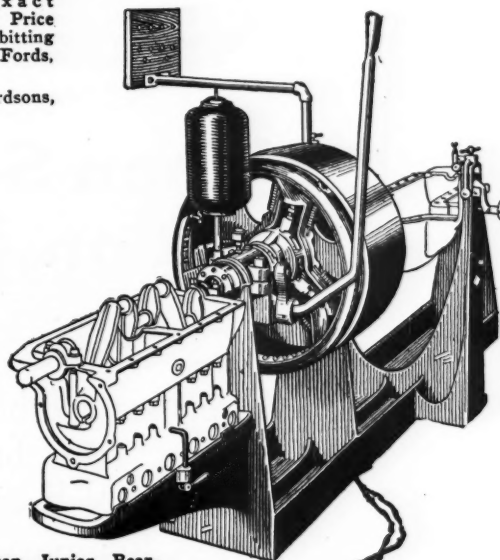
SOLE DISTRIBUTORS FOR

The Service Station Equipment Co.
The Hempy-Cooper Manufacturing Co.
The Peterson Engineering & Manufacturing Co.
The Steere-Kitson Co.,
and other manufacturers of garage equipment.

Company



A Hempy-Cooper Boring Machine quickly bores all crankshaft bearings in exact alignment. Price with Babbitting Jig, for Fords, \$125.00. For Fordsons, \$150.00.



American Junior Bearing Burning-in Machine and motor Test Stand. Finishes engine bearings to a 100 per cent glazed surface in a few minutes. Price, \$197.00.

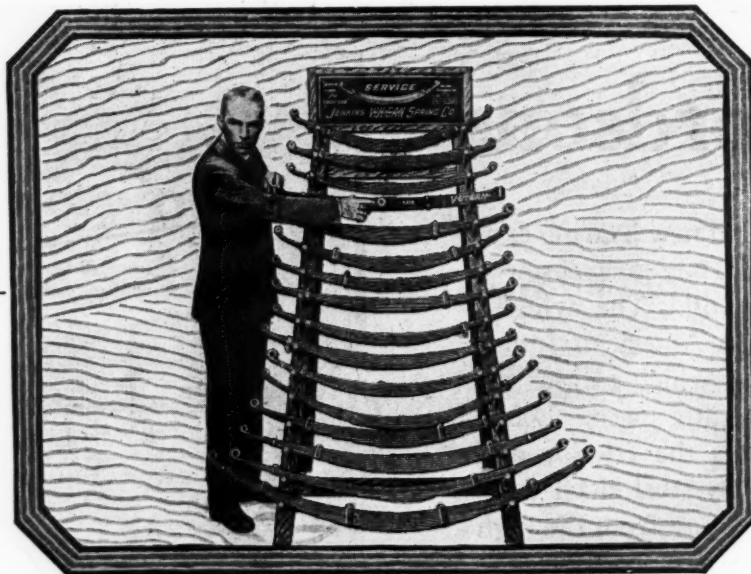


Profit-Making Machines and Tools for the Ford and Fordson Service Station:

Automobile Engine Tester
Bearing Burning-in Machine for Ford and Fordsons
Motor Test Stands
Engine and Axle Stands
Bearing Boring Machines and Re-Babbitting Jigs
Cylinder Re-boring Machines for Fords and Fordsons
Straightening Presses
Arbor Presses
Power Grinders
Air Compressors
Transmission Reaming

Machines
Special Ford Reamers
Rear Axle Sleeve Pullers
Radiator Test Plugs
Piston Clamps
Connecting Rod Straightening Jigs
Bench Motor Clamps
Transmission Drum Clamps
Rear Axle Pinion Gear Presses
Pinion Gear Pullers
Piston Bushing Reamers
Crank and Cam Shaft Testing Machines

Emergency Wheel Clamps
Wheel Pullers
Valve Port Renewing Tools
Bushings Drivers
Turning Bars
Speed and L. Wrenches
Special Jacks
Rim Tools
Tow Bars
Combination Electric Drills and Valve Grinders
Visible Measuring Gasoline Pumps
Special Ford and Fordson Tools and Machines



When Springs Break,
put on **VULCAN**
The Replacement Spring

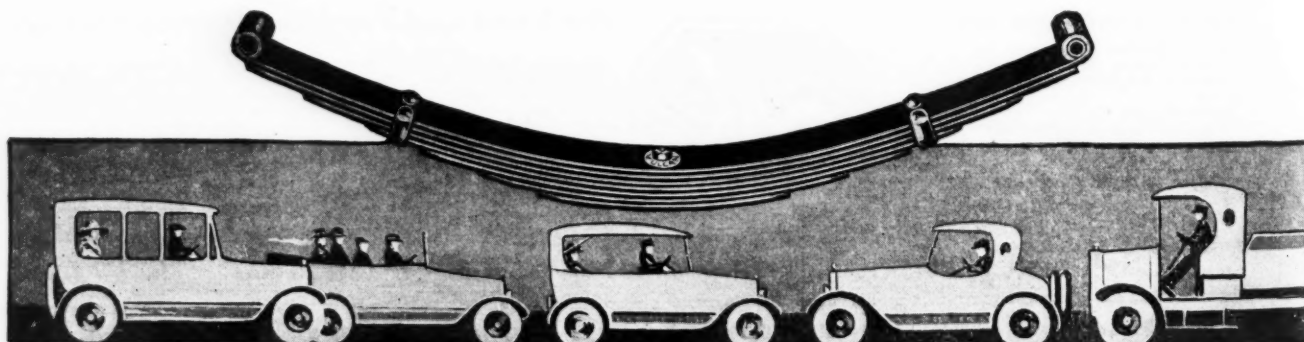
Service is the keystone of success. If you can fit a man's car with a VULCAN Spring when he needs it, you loosen his purse strings and tighten his good will.

Ask about the VULCAN Display rack that comes free with your first order.

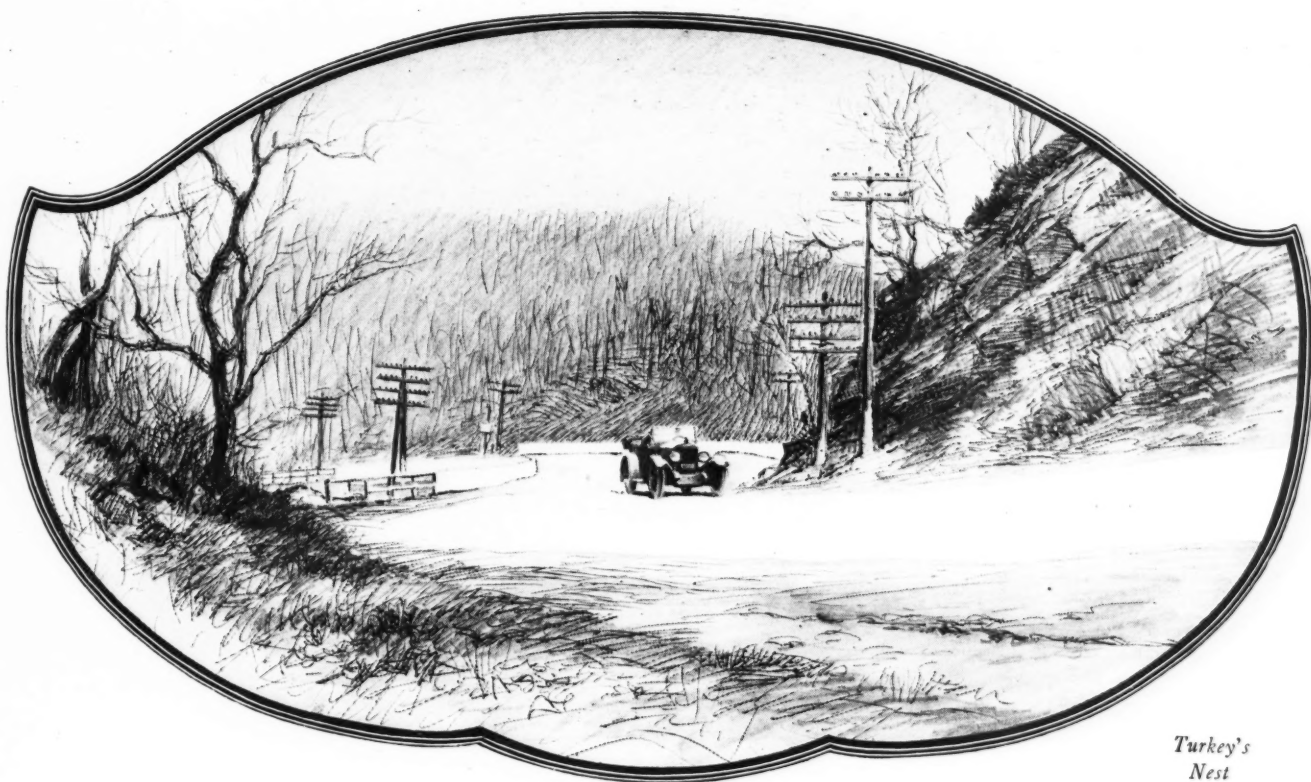
Jenkins VULCAN Spring Co.

Factory, Richmond, Indiana.

*Branches: Atlanta, Ga. Dallas, Tex. Minneapolis, Minn.
Boston, Mass. Kansas City, Mo. Reading, Pa. St. Louis, Mo.*



JORDAN ARROW



*Turkey's
Nest*

*“Look out!
HERE
COMES
BEGG”*

JORDAN



Russell S. Begg
Jordan Chief Engineer

“Look out! HERE COMES BEGG”

HERE is a story which will be read with dramatic interest by every manufacturer, dealer, salesman, mechanic and owner, who has known that peculiar thrill which makes this the fastest, and most fascinating business in the world — that wonderful something you feel in a nimble test car, flying over the mountains at midnight.

If you have never experienced a certain joy, familiar to the man who loves this business — stop now — the story won't interest you.

But you must hear the story from the beginning.

It began this way:

Two years ago, we formed the idea that the day of the big, bulky, seven-passenger “bus” was on the wane. We felt that the carry-all days in motor cars were passing.

We once bought them like graphophones — large enough to entertain the neighbors.

Now our friends have motor cars of their own.

Begg and I were watching the endless line of automobiles moving down the boulevard, and counting the average number of passengers carried.

We found the average really less than five.

Now and then a motor bus came along, with a megaphone man calling attention to the sights of interest.

Very frequently a cheap car passed, carrying seven passengers and one or two dogs.

The most expensive cars, the aristocrats of motordom, carried two and three and sometimes four people.

Occasionally we saw seven people in a high-grade car, but they all looked strangely uncomfortable.

I turned to Begg and said:

"If you had a million dollars to spend on a model car, what kind of a car would you build?"

Begg beamed and replied:

"I'd build a very high-grade, light-weight, good-looking, perfectly balanced, rattle-proof, comfortable, economical performing car, that would stay put — a car for the experienced owner who has acquired good sense."

That day, Begg started, and for two years he worked night and day to build and prove his ideal car.

Since Gottlieb Daimler invented the internal combustion motor and M. Levassor introduced the present system of power transmission, experienced motor car engineers, dealers and owners, have been anticipating the production of this type of car.

Occasionally the ideal has been approached, with a resultant demand which brought the maker to the heights of prosperity — and excessive production which defeated quality.

Begg set out to build the best motor car he knew how to build, regardless of all considerations of price, competition and sales expediency.



*The Secret
Lies in Balance*

A chief engineer without his hands tied by sales department opinion, engineering precedent, or dealers opinion is a rare spectacle.

Begg was fully conscious of his opportunity.

He commanded the spirit and brains of the finest engineers in America, called upon the parts specialists to do their best, and began building experimental cars in the spring of 1917.

Five model cars were produced before the standard was fixed, and the final car approved.

Every model was driven at least 20,000 miles, making a grand total of 100,000 miles to realize a great ideal.

Thus he set himself sternly to the task of building a car which would successfully do battle in the markets of the world for the good name of Jordan, when peace came back to the earth.

Consider, if you will, how one million experienced owners would vote on every detail of their ideal car, if they had the power to do so.

Think, if you can, how few would vote for this feature or that feature, but how many would vote for those dominant features which characterize the best average product of man's hands and brain.

How little opportunity would the freak designer or the man who tries to revolutionize the industry, have in a crowd like that.

Every feature — every detail — was determined by Begg after an exhaustive study of all cars built in America and abroad.

He was building for a world reputation — and he knew it.

American engineers are the best in the world. They have nothing to learn from abroad, either in design or workmanship.

They need, more than anything else, the courage to demonstrate to the sales department, that there are bigger dividends in quality merchandise than in low price to catch the dealers.

A new motor, designed and built exactly



*The Starting
Post At
Uniontown*

to suit such an ideal car was necessary — of course.

Then followed long months of day and night work on the drafting board, and in the experimental room.

Only an artist who has painted a great picture, can know the thrill that a good engineer feels in this work, which to the ordinary man, is very dull.

Begg had no faith in magic — no tolerance for old tricks.

He knew that the smartest, cleverest policy in the world, is plain, old-fashioned, honesty.

So he asked the master motor builders of the world to produce a motor for Jordan — just an honest job, using the best materials and the finest workmanship.

He asked for no new principles — no attempts to defy inertia.

He dreamed of no advertising revolution of the laws of the universe.

He did not desire to attain speed and pay for it with excessive vibration.

The result you must already have guessed — a remarkable motor.

Doesn't that always happen when you do things sincerely?

It is a Six — of course — because that is the world trend of motor design.

The twelve with $2\frac{3}{10}\%$ — the eight with $11\frac{7}{10}\%$ — the four with $29\frac{5}{10}\%$, are on the descending scale of American and foreign production.

While the Six, with $55\frac{8}{10}\%$ of the total produced in this country, is on the rapidly ascending scale here and abroad.

The answer is simple.

The Six furnishes the greatest power for its

weight and simplicity, with the least vibration.

Begg knew that service and stability in a motor car, as in a watch or a human being, depends upon balance.

Balance depends upon the careful distribution of weight, the length of springs, the quality of materials used, the delicate point of spring suspension, and the arrangement of the steering apparatus.

When a cheap carbon steel spring is overstressed beyond a certain point, it reaches its elastic limit and the spring rapidly goes to pieces.

Begg chose springs of Chrome Vanadium steel, long and suspended with delicate precision.

He distributed the weight correctly, therefore the whole tendency in this light car, is towards forward motion without ruinous side-sway.

This is only one detail, emphasized to illustrate the care and precision with which



*Midnight and
Moonlight in
the Mountains*

Begg designed and chose material for the Silhouette Five.

Thousands and thousands of miles, Begg drove at the ordinary touring speed at which a man with his family would drive his car, just to see how it would perform and take the hills at ordinary speed.

Then miles and miles of high-speed work, almost constantly above forty-five miles per hour, and again long stretches of fifty-five to sixty miles per hour to test lubrication.

Then came the long series of tests at Uniontown Hill, Pa.

Nine hundred and sixty-three miles was the speedometer reading on that tortuous hill alone.

Three and two-tenths miles in length, it rises from the hills of Pennsylvania to the summit of Laurel Mountain, beginning at Turkey's Nest and ending at the broad veranda of the Summit Hotel.

That is the place to which motor car manufacturers who dare, take their testing cars to ascertain their capacity for performance, and work out problems of carburetion.

In that corner of Pennsylvania are grades which really punish an automobile.

No matter which way you go, you are merely hanging on by your eyebrows.

I suspect the moon fell out of Fayette County, Pennsylvania, when she was thrown off the earth.

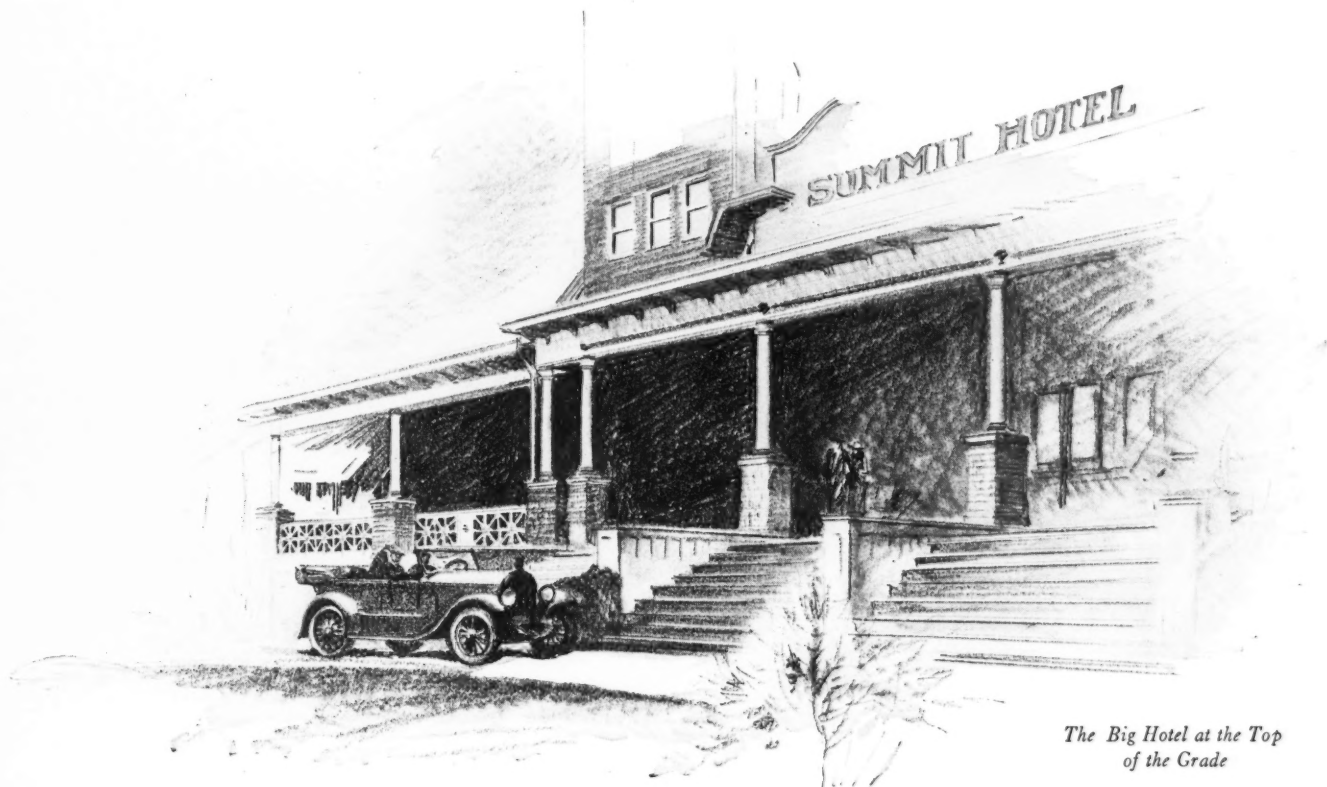


"How Fast was He Going?"

There is no legal speed limit necessary on Uniontown Hill. You can go just as fast as you can go.



Hills Alluring up, and Enticing Down



*The Big Hotel at the Top
of the Grade*

There are two convenient watering troughs on the way up the mountain where many motor cars and horses find it desirable to stop.

Then there is a broad veranda at the Summit Hotel where you can sit and listen to the laboring motors roaring up the grade.

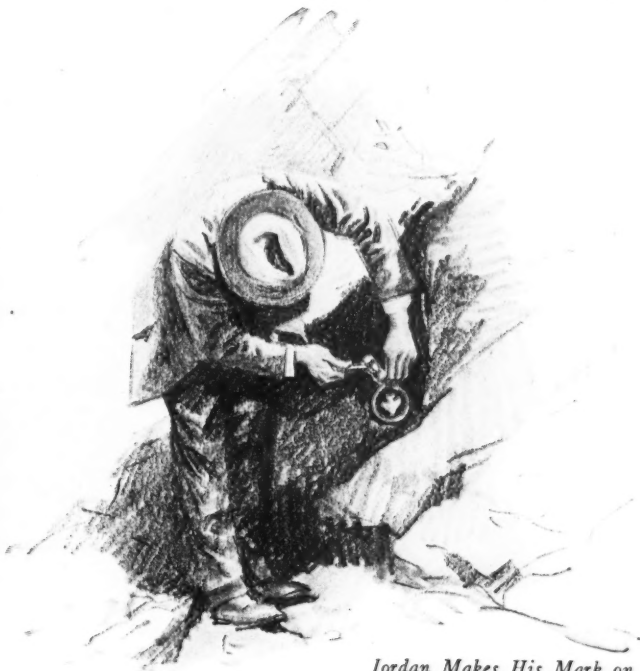
At the foot of this hill is the famous "Turkey's Nest," a steep and tortuous curve and a heart-breaker for cars that lack "pep." I have seen motor cars driven into Turkey's Nest at sixty miles per hour at the risk of the driver's life, go limping out into the stretch beyond at scant thirty.

Then *if* — the gas feeds to the carburetor — *if* the water does not vanish in steam — *if* the car is not too heavy for its power and *if* the motor will lie down and pull like the dickens — *then* you go over the crest on high gear. This is motor car bliss in those parts and means immortality in Uniontown.

Kreis and Eckerson of Continental, Edwards of Delco, Hanson of Stromberg, Begg, Carl Landane and I were there to see

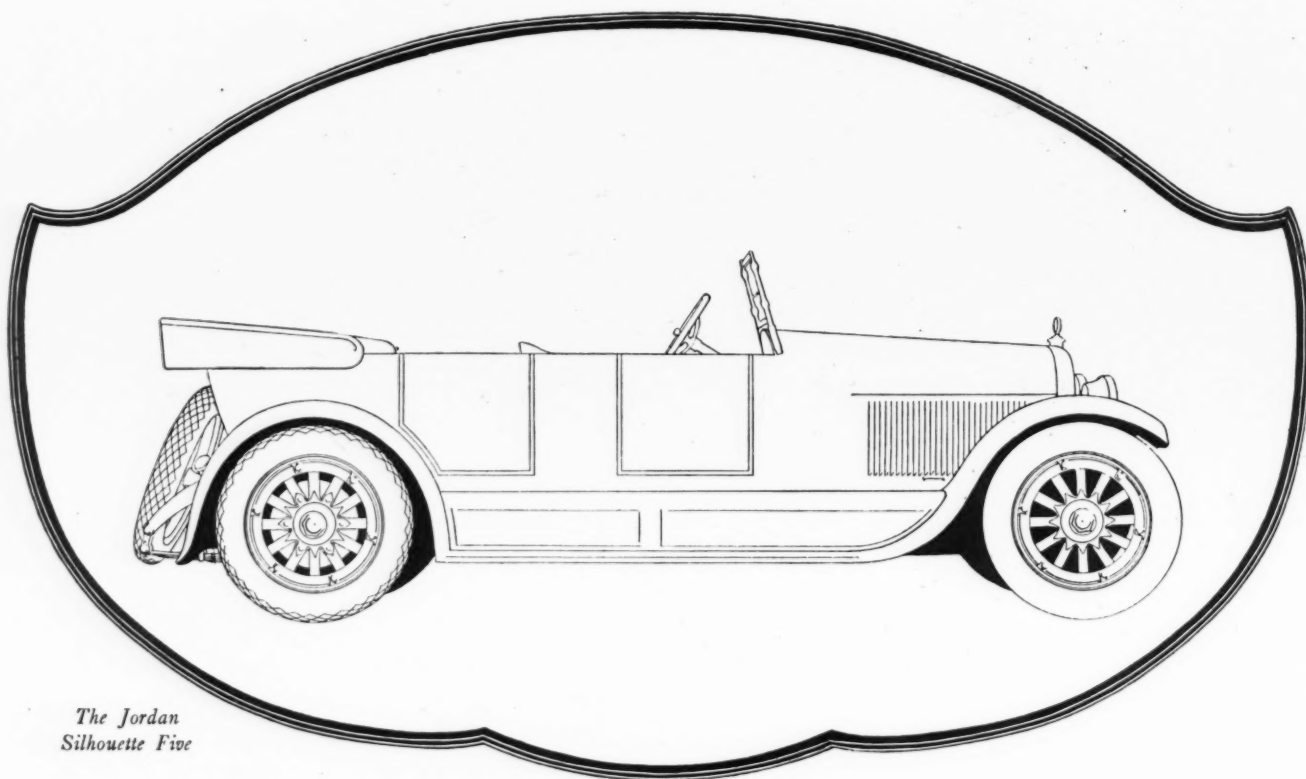
the Silhouette Five race into Turkey's Nest and on like a demon up the hill.

She went over the top like a scared rabbit,



*Jordan Makes His Mark on
Uniontown Hill*

JORDAN



*The Jordan
Silhouette Five*

and we knew she was qualified to climb every test hill from Maine to San Diego. Then began another long series of tests for carburetion, ignition, lubrication, cooling — and let me tell you that not a single detail of that car was changed, proving that Russell Begg knew what he was doing when he laid out the job.

“Look out! Here comes Begg”— For days and days that call rang out every half hour as Begg tore up and down that hill — driving and driving and driving — watching, listening, feeling the remarkable action of his ideal car.

Then he came back to Cleveland, and one day he walked in, smiled and simply said:

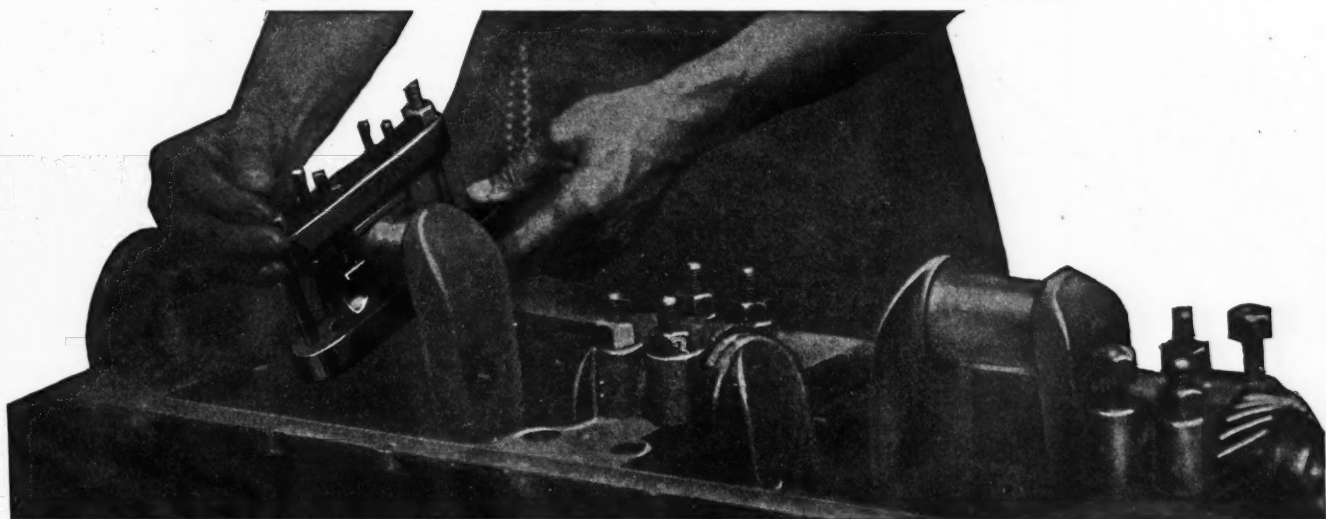
“Well — the car is ready for production.”

There is an indescribable something about a job well done, which commands the respect and confidence of the experienced owner.

That conscientious application to a duty which was a pleasure, has given to Russell Begg and to the Jordan Company, the *Silhouette Five* — The American Ace of Light Cars.

JORDAN MOTOR CAR COMPANY, Inc. CLEVELAND





The Quick, Easy and Profitable Way to Grind a Crankshaft

JUST one job pays the cost of an Atlas Abrasive Tool. (Patented.)

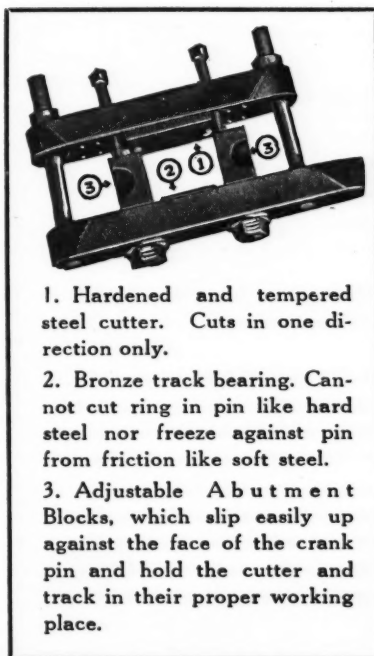
No experience required. The Atlas simplifies crankshaft grinding.

No lathe or other equipment required. Use a vise if you like, but remember that the crankshaft need not be removed from the crank case.

One hour completes the work on any crankshaft.

No machine shop guarantees greater than two-thousandths of an inch accuracy. With the Atlas you get within one-thousandth.

If you need an Atlas but once a year, it accommodates your customer, puts a good profit in your pocket and gives you a reputation for service.



Another hand tool would cost from five to ten times the price of an Atlas—you would not get Atlas con-

venience—nor simplicity of its one cutter principle—nor the saving of time in making adjustments.

Adjustable to crank pins and bearings up to 2½ inches diameter for all passenger cars and trucks.

Hundreds of garages and repairshops are enthusiastic users of the Atlas Abrasive Tool—it's selling like hot cakes.

A good mechanic would rather part with a \$50 bill than with his Atlas, if he could not buy another.

Price, complete with cutter, \$10, postpaid. Extra cutters (including bronze bearing tracks) good for from 10 to 20 pins or bearings, 30c each.

Wire your order today.

ATLAS MFG. CO.

North Canal St., Pittsburgh, Pa.

*The
Completely
Cartonized
Line*

Gilmer

Woven Endless Fan Belts are built to an exact, scientifically correct size for the makes and models of cars listed below.
Select the belt for your car by group number. Each belt plainly marked with its group number.

MAKE	YEAR	MODELS	GROUP NUMBER	PRICE
Allen	1915-16-17-18-19	34-37-41	3	75
American	1917-18		6	75
Anderson	1916 to 1920	With 7W Motor	12	75
Apperson	1916-17-18-19	6	5	75
Apperson	1920	8-20	9	100
Auburn	1918	Continental Motor	6	75
Biddle	1916-17-18-19	D & H	17	75
Briscoe	1916-17-18-19	B4-24	4	75
Buick	1914	B36-37-38-54-55	3	75
Buick	1915	C24-25, D36-37, C54-55	3	75
Buick	1916	D54-55	3	75
Buick	1916-17	D44-45-46-47	11	75
Buick	1917	D34-D35	11	75
Buick	1918	E34-E35	11	75
Buick	1918	E44-E45-E47-E49-E50, Early Type	11	75
Buick	1918-19	E & H44-E & H45-E & H46 E & H47-E & H49-E & H50	7	75
Buick	1920	K44-K45-K46-K47-K49-K50	7	75
Case	1915-16	25-30	17	75
Chalmers	1915	26-26B-26C-29-32A	26	100
Chalmers	1916	32B	26	100
Chalmers	1916-17-18-19	35A-B-C-D	17	75
Chandler	1914-15	All Models	12	75
Chandler	1916-17-18-19-20	All Models	3	75
Chevrolet	1916-17	490	24	75
Columbia	1918-19	Continental Motor	12	75
Crow-Elkhart	1916-17-18-19-20		4	75
Davis	1916-17-18-19	6-18	12	75
Detroitier	1917		12	75
Dodge	1915-16		6	75
Dodge	1917-18-19-20		3	75
Dort	1915-16-17-18-19	All Models	4	75
Elgin	1916-17-18-19	"6"	4	75
Empire	1916-17-18	45-50-51	6	75
Essex	1919	20	21	100
Ford	1911-16	T	1	50
Ford	1917-18-19-20	T	2	50
Geronimo	1917	4-A-45	6	75
Geronimo	1918	6-A-45	3	75
Glide	1916-17-18-19	6-40	6	75
Grant	1915-16	T & V	4	75
Haynes	1915-16-17-18-19	30-46	12	75
Hollier	1917-18-19	Six	4	75
Hudson	1916-17-18-19-20	Super Six	5	75
Jeffery	1917	671	5	75
Jeffery	1917	472	20	100
King	1915-16	D & E	22	75
King	1917-18-19-20	EE F & G	23	75
Kissel	1915-16-17-18-19	638, "Custom Built Six"	10	75
Lexington	1917-18-19	"Minute Man Six"	10	75
Liberty	1916-17-18-19	"6"	12	75
Madison	1918-19		6	75
Maibohm	1917-18-19-20	B	17	75
Marmon	1916	34	20	100
Maxwell	1915	22-25, G & D Starter	15	75
Maxwell	1915	22-25, S-H Starter	14	75
Maxwell	1916-17	25	8	75
Maxwell	1918-19	25	9	100
Maxwell	1920	25	16	100
Mercer	1916-17-18-19	4	20	100
Mitchell	1916-17-18-19	C42-D40-E40	8	75
Mitchell	1920	E-42	19	100
Monroe	1918-19-20	M-4	18	125
Moon	1918-19	6-36	5	75
National	1917-18-19	Highway 12	1	50
National	1917-18-19	"6"	5	75
Overland	1915	80-81	5	75
Overland	1916	83	5	75
Overland	1916	75	20	100
Overland	1917-18-19	85-4 cyl	5	75
Overland	1917-18-19	90 & 90 CC	20	100
Paige	1915	6-36	12	75
Paige	1916	6-38	12	75
Paige	1916	6-46	25	75
Paige	1917	6-51	25	75
Paige	1917-18	6-39	12	75
Paige	1918	6-55, First 4150 cars	25	75
Paige	1918	6-55, After No. 4150	26	100
Paige	1919	15, Small Six	5	75
Paige	1919	16-Big Six	26	100
Paterson	1916-17-18-19	6	6	75
Reo "4"	1915-16-17-18-19	R & S	10	75
Reo "4"	1915-16-17-18-19	M & N, 6 cyl.	13	100
Roamer	1918	D4-75	20	100
Saxon	1916-17-18-19	6	5	75
Stearns	1919-20		1	50
Stephens	1916-17	Salient 6	6	75
Studebaker	1916-17-18-19	4 & 6	6	75
Templar	1917-18-19	4-45	20	100
Vellie	1916-17-18	6	6	75
Woods	1918		4	75
Willys-Knight	1916	84	5	75

Gilmer
WOVEN PRODUCTS
PHILADELPHIA



"It Has Replaced the Old Style Time and Money Wasting Method of Handling Fan Belts in Bulk. Right Size at a Glance."

The Gilmer Cartonized Line of Standard Packages

FOR the convenience and relief of dealers, Gilmer originated the standardized package—the "group-and-carton" plan for stocking belts.

Each carton contains 25 Gilmer Woven Endless Fan Belts of one size that will fit a certain group of cars. On each carton is printed the group number and the entire list of cars built since 1915 on which the belts in that package can be used. Each belt is permanently and plainly stenciled with its group number.

Dealers everywhere tell us it is the sensible, practical way to handle fan belts. It permits of quick, clean-cut, efficient service.

It saves time for both dealer and customer. And what is most important, it prevents confusion as to identity—for a Gilmer belt is permanently marked with the group number of the cars it will fit—

and a permanently marked belt is always a salable belt. You never have to guess about size.

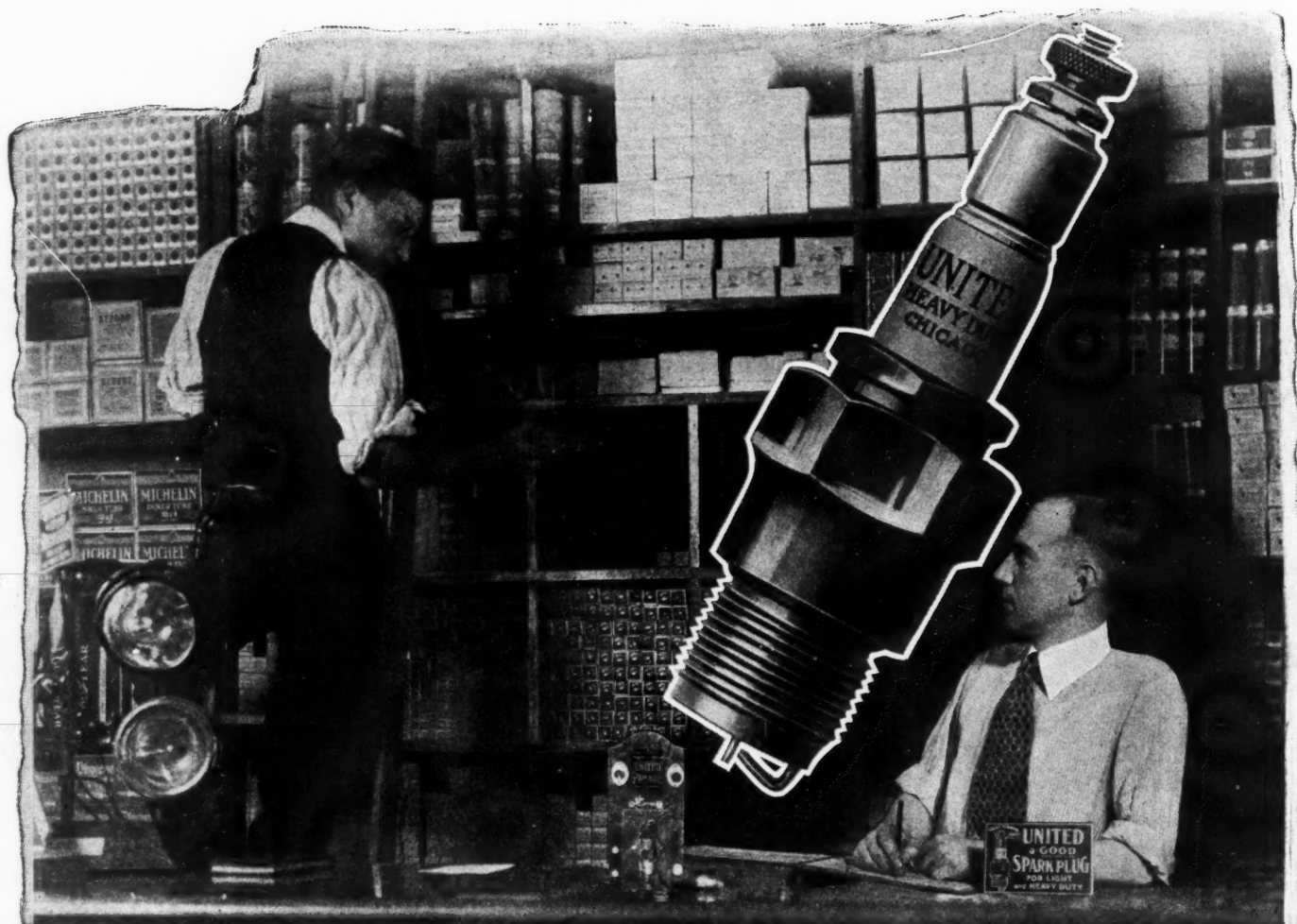
This is the idea developed by Gilmer to help dealers sell the only fan belt that will stand the famous "heat, oil and moisture" tests—the choice of car builders on eight out of every ten cars built—the belt that drives both fan and generator on the Maxwell car—the belt that has withstood more searching laboratory experiments and road tests by car builders than any other make of fan belt ever built.

The Gilmer carton idea means easier sales and Gilmer quality means a longer list of satisfied customers for you. Write to any good jobber for prices, discounts and full details.

L. H. GILMER CO.
Philadelphia, Pa.

Gilmer

WOVEN ENDLESS
FAN BELTS



"Double the Order on UNITED Plugs"



***Made for a Purpose—
Consistent Ignition***

RETAIL PRICE

Heavy Duty\$1
for Trucks and Tractors

Junior Type75c
for Passenger Cars

"United Spark Plugs are our Best Sellers—

"People buy United Spark Plugs as soon as I show them.

"When they see the sturdy, serviceable appearance of United Plugs—the careful assembly, and the "Lockt" terminal with its positive contact—they know they are buying a good spark plug.

"Put United Plugs into every cylinder' is what I tell them. I don't have to make excuses for United Spark Plugs—they give consistent ignition—absolute satisfaction—to the end.

"That's why our repeat business is so big—our customers come back and they buy United, the next time they want spark plugs.

"And the United display catches every one's eye—it makes our sales mount."

Look in the Chilton Automobile Directory and Auto Trade Directory for List of Jobbers handling United Spark Plugs.

Ask your Jobber for the Plug in the Yellow Checkerboard Box

United Manufacturing & Distributing Co.

LAKE SHORE DRIVE AND OHIO STREET

CHICAGO, ILLINOIS

Pacific Coast Representative
A. C. RIDDELL
Marvin Bldg., San Francisco, Cal.
Higgins Bldg., Los Angeles, Cal.

New York Representatives
GRAY-ANDREWS CORPORATION
73 Warren St., New York

MOLINE UNIVERSAL TRACTOR



All the Work-All the Time

Now is the season for tractor belt work, and Moline-Universal Tractor owners are finding it as versatile at the belt as in the field. The busy tractor is the cheapest tractor and no tractor can hustle all the year around like the Moline-Universal.

From early spring to late fall it performs every field operation, including cultivating. This feature most completely saves horses. One man operates both tractor and implement, saving man power. These extreme man and horse saving features place the Moline-Universal Tractor far above all others in point of economy.

After the field work is all done it can perform an endless variety of belt work, up to a 16-inch ensilage cutter or a 22-inch separator. Its wonderful power at the belt has been publicly and officially demonstrated—26.48 h.p. at Salina and 28.70 h.p.

at Columbus—very substantially exceeding its rated 18 h.p.

Such great reserve power assures long life and the economical and satisfactory operation of belt driven machinery under all variations of load.

Now is the time to sell the Moline-Universal because it is an especially good time for farmers to buy it. While gaining the advantage of its belt power all winter long in sawing wood, grinding feed, shredding, etc., its mechanism is learned. When spring work opens up the tractor is ready from the drop of the hat and its motor is broken in, ready to work at top speed until the season's end.

Farmers of foresight are buying the Moline-Universal Tractor and dealers of business foresight are selling it. If your territory is not already taken, get in touch with us at once.

MOLINE PLOW CO.

MOLINE, ILL.

RED



Red Line Combination Body Polish, Hood and Fender Dressing



Red Line Spotname

Complete Sample Line Sent Free to Representative Jobbers



Red Line Mohair Top and Lining Dye



Red Line Leather Renewer



Red Line Radiator Cement



Red Line Timer for Fords



Red Line Fossillac Displaces Shellac



Here is an opportunity for every jobber in the country—who is a jobber—to become acquainted with, and know, the most comprehensive, complete, and salable line of automotive products on the market today.

And not a cent are you asked to invest.

A complete sample line of RED LINE Products is waiting for you in our stock room. Your request by wire, letter or telephone will bring it to you straight.

Take advantage of this unusual offer. See the attractive containers—the kind that stand out on your dealers' shelves, and sell themselves. Try the products—and convince yourself of the absolute dependability—the unfailing salability of every one of them.

RED LINE Products are now being marketed nationally in answer to a national demand. First of all, they appeal to dealers—and best of all they sell.

Wire, write, telephone—now.

RED LINE Inc.

LINE

**Dealers: We Guarantee
Your Profit on Every
RED-LINE Sale**

You may sell RED-LINE goods to your customers with the positive statement that their money will be returned if goods are not entirely up to their expectations. We in turn will refund to you not your price, but the retail price paid you by the customer. We GUARANTEE you profit on every RED-LINE sale.

In Michigan—the greatest automobile state in the Union—RED-LINE Products abound. The sales opportunity wrapped up in the attractive golden rod, blue and red packages is being turned into cash.

Just so, it is going to be turned into cash in all the other states—because dealers and users are the same wherever you find them.

RED-LINE Products are now ready for national distribution. They are ready for jobbers and dealers, bound to make good.

And in addition to the sales co-operation from the factory, and the natural selling force of the cartons—jobbers and dealers both get an unusually good discount, without raising the list price a penny.

It's good business to look into the RED-LINE future—and to see its present. There is success in both of them for you.

Dealers: Stock from your jobber, and write for complete information.

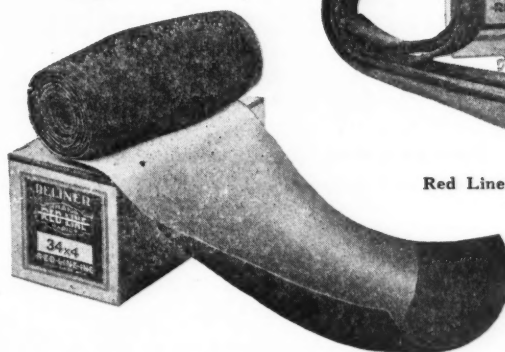
Red Line Valve Grinding Compound



Red Line Carbon Remover



Red Line Tire Saver



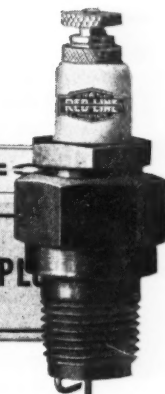
Red Line Reliners



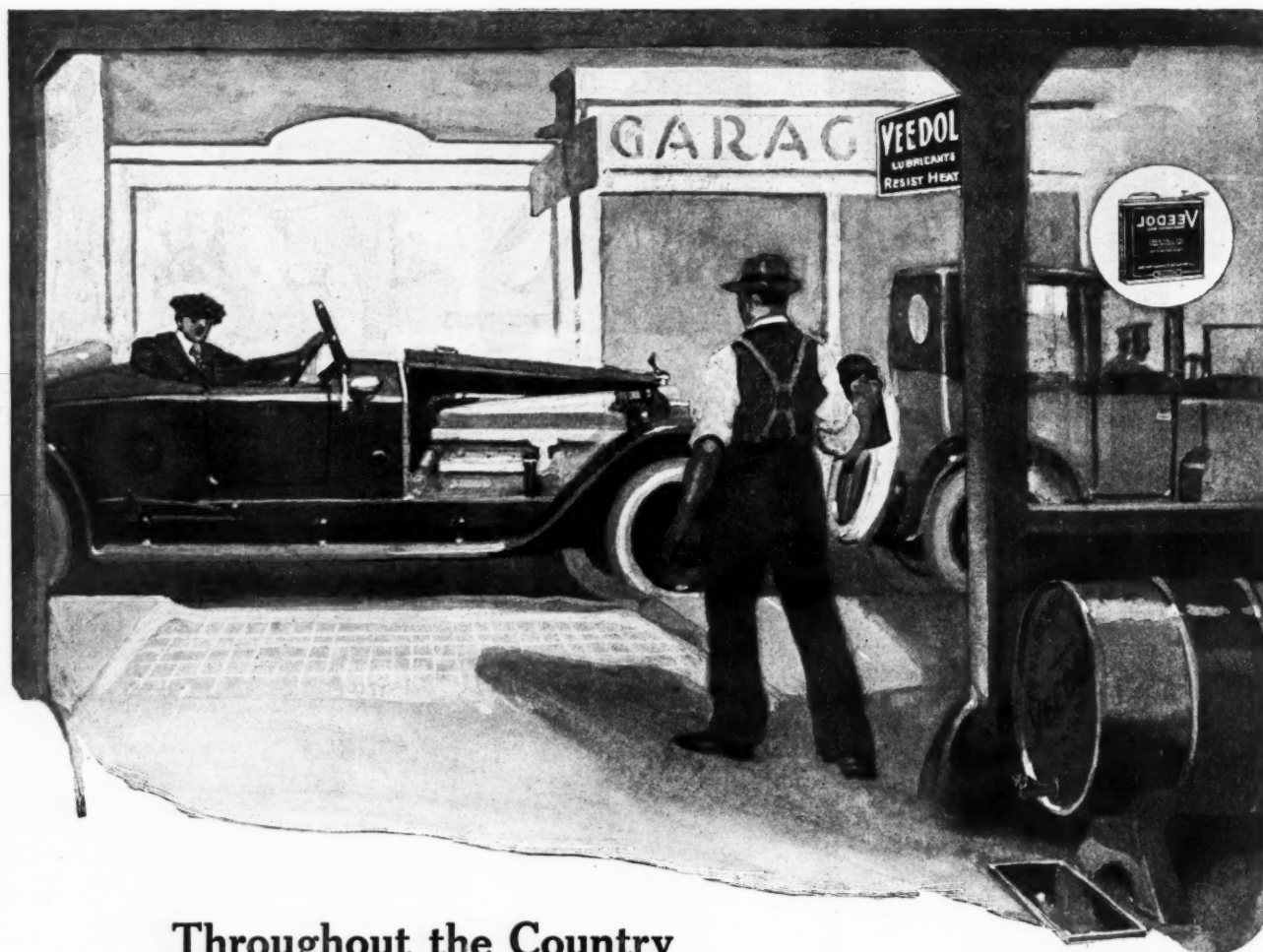
Red Line Transmission Set for Fords



Red Line Penetrative Oil



Grand Rapids, Mich.



Throughout the Country Dealers Are Now Fixing Sales Quotas for 1920

You can use the figures given here to determine how much business you should get. Get your whole quota for next year

A NEW PLAN—the quota plan—has been borrowed from the factory to help meet the problem of rising costs.

Every big sales organization determines at the beginning of each year its estimated volume of business for the year, and works toward that volume on every product handled. In the same way dealers all over the country are setting quotas on oil, tires, lamps and all accessories.

In order to equal profits of former years they know that in most cases they must double their business, so as to meet the increased costs of food, clothing, clerk hire, rent, taxes and expenses of every kind.

The story of one New England dealer who made an unusual success of this plan is of special interest to the trade. How he determined his estimated volume of business for 1919 and found out just how much extra effort was needed in every department from tires to oil is told below.

HOW THIS DEALER'S PLAN WORKED

The simple system used by this New England

man is described in terms of lubricating oil. It can be applied to all products.

He made a count of the number of regular customers he had. He knew that every passenger car owner uses about $\frac{1}{2}$ barrel of oil a year. Every truck uses about 3 barrels, every tractor about 4 barrels.

This dealer has one hundred regular customers, 90 passenger cars, 7 trucks and 3 tractors. Therefore he established his quota as follows:

3 tractors @ 4 barrels per year.....	12 bbls.
7 trucks @ 3 barrels per year.....	21 bbls.
90 passenger cars @ $\frac{1}{2}$ bbl. per year.....	45 bbls.
100	78 bbls. of oil

He saw at once that he was selling hardly half of all the oil these customers were using. Many of them paid little attention to oil and bought a quart or a gallon wherever they happened to be when they needed it.

In order to increase his profits he determined to try to sell each of his 100 customers *all the*

oil they used. He determined to specialize on one high grade oil and push it. In this way, counting his usual transient trade, he felt that he could more than double his profits. He would earn additional quantity discounts, due to selling one oil, greatly increasing his profit per barrel.

HE MET HIS QUOTA— AND TREBLED HIS BUSINESS

This New England dealer increased his sales by specializing on oil. He circularized his country trade and on one day each week pushed Veedol. He used the Veedol story. This he told in the same way in which it is hammered home in two-color pages every month of the year in the Saturday Evening Post, Collier's Weekly, Literary Digest, pages in Country Gentleman, Successful Farming and many other papers. He explained that Veedol reduces by 86% the amount of sediment formed in oil by the terrific heat of the engine. He explained that Veedol reduces evaporation and increases mileage per gallon from 25% to 50%. He showed his customers that 90% of engine trouble is due to inferior oil.

Last year this New England dealer sold almost two car-loads of Veedol.

Because he got maxi-

mum quantity discounts his profits jumped from \$550 to \$3200 in one year. This is the story of one man's success in establishing a quota, specializing on one oil and putting in a little extra effort.

How to establish a sales quota which brings greater profits on accessories.

1. Find out how many regular customers you have.
2. Multiply this number by the number of tires used by one customer in a year, or the amount of oil, or the number of electric bulbs, etc. For oil, multiply passenger cars by $\frac{1}{2}$ barrels, trucks by 2 barrels, tractors by 3 barrels.
3. With this quantity established you know the minimum business you should do in your territory. In addition to your transient trade you should sell ALL the tires, ALL the oil, ALL the bulbs, which each of your customers uses each year.

YOU CAN INCREASE YOUR PROFITS

You can follow this man's system without extra cost and with almost no extra effort. You, too, should be able to put an extra thousand dollars or more into your net profit balance. Establish your quota at once—find out how much business you *should* do.

Write today for the Veedol proposition. Examine the dealers' quantity discount contract which pays the regular dealers' 33 1-3% discount with the following extra quantity contract discounts:

5% additional on \$300 to \$599
(or about 10 bbls. to 19 bbls.)

7½% additional on \$600 to \$899
(or about 20 bbls. to 29 bbls.)

10% additional on \$900 to \$1199
(or about 30 bbls. to 39 bbls.)

12½% additional on \$1200 to \$1499
(or about 40 bbls. to 49 bbls.)

15% additional on \$1500 and up
(or about 50 bbls. and up)

On car load lots of Veedol (about 70 bbls.) shipped direct from the refinery, the dealers' profit is 33 1-3% plus 17½% quantity discount, freight prepaid. Thus the net profit on 70 barrel car-load shipments is over \$1800.

Let our salesman explain to you just what can be done in your own garage or store.

Watch the advertising pages of this publication for articles about successful dealers who have doubled and trebled their business. Next month read the remarkable story of Jacob L. Haines, of Lancaster, Pennsylvania, who started as a clerk in a hardware store and now runs a big garage and a wholesale store. He carries a stock worth \$50,000 in one of his stores alone.

Mail your request for information on Veedol at once.

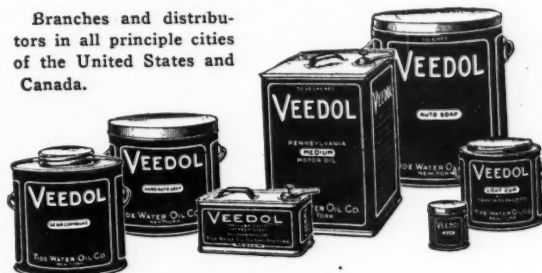
TIDE WATER OIL

Sales Corporation

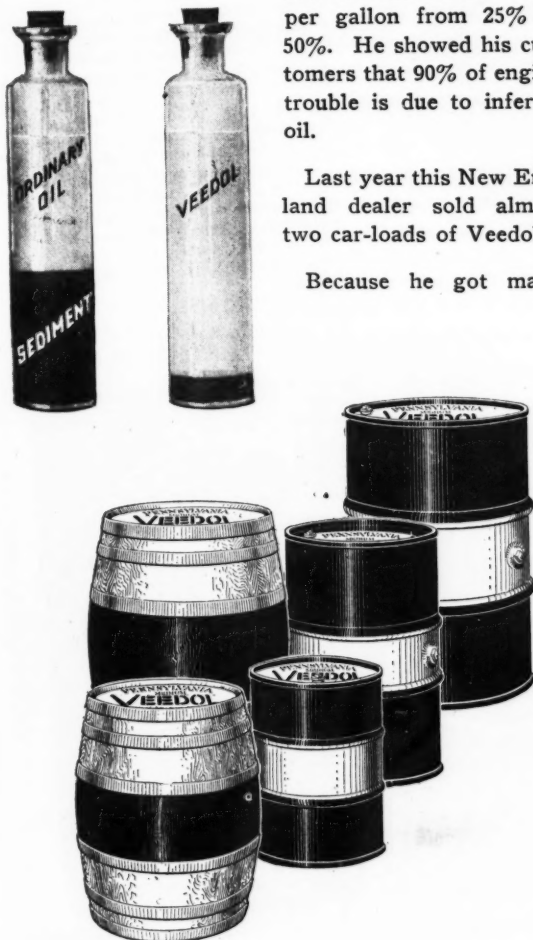
11 Broadway,

New York

Branches and distributors in all principle cities of the United States and Canada.



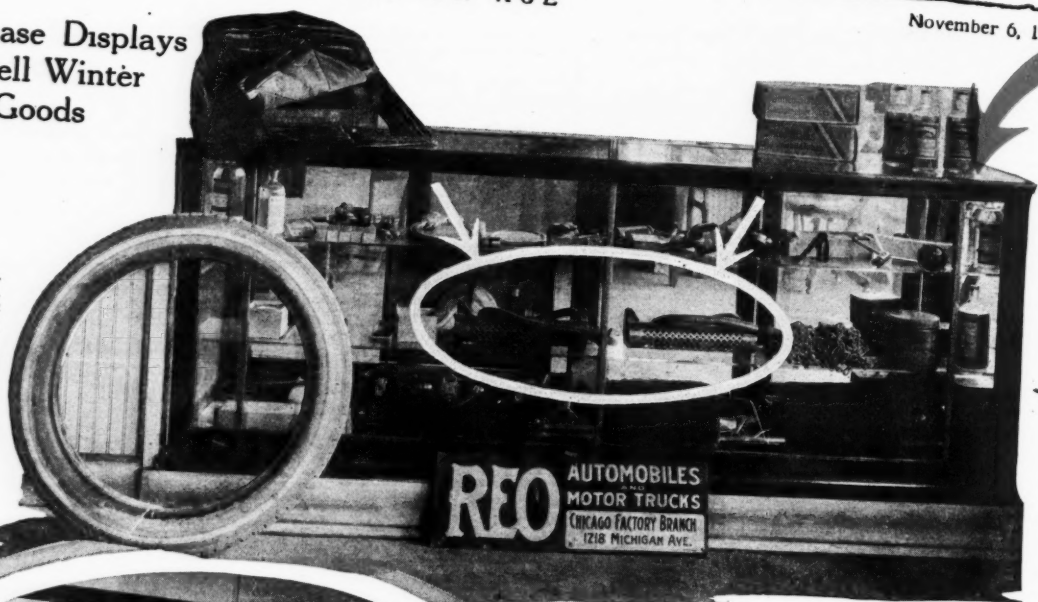
Veedol is put up in barrels, half-barrels, steel drums, 5-gallon, 1-gallon and ¼-gallon cans, in various grades for every make of automobile, truck and tractor



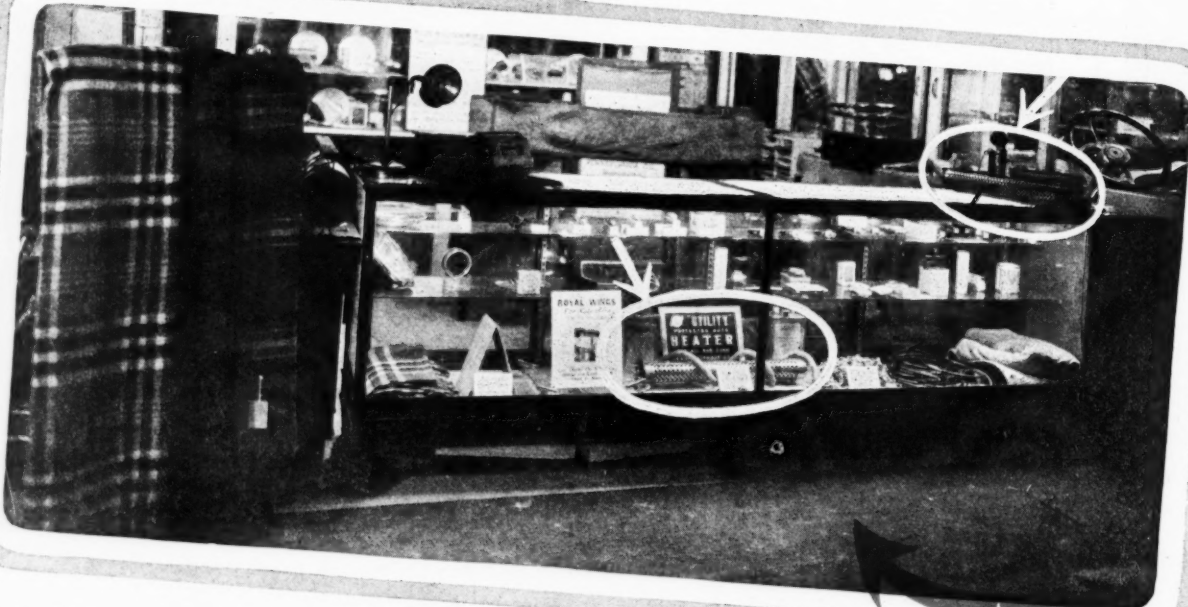
16

Showcase Displays to Sell Winter Goods

Here is a showcase display used in the Chicago factory branch of the Reo. Note the radiator and hood cover, car heaters tubes and body polishes prominently displayed. The entire case contains nothing but winter accessories



At the left is shown a special winter accessory display used by the Dashiell Motor Co., of Chicago, containing robes, heaters, with placards suggesting to owners what to buy. Below is a neat looking arrangement of accessories in the showcase of the L Markle & Co., Chicago Studebaker branch. Robes are prominently arranged at the left and everything from electric wheel warmers to anti-freeze solutions are in evidence. In all of these illustrations, note the clean appearance of the showcases





Look at All the Displays
of 1919-1920 Best Winter Sellers
and You Will See
UTILITY PROTECTED HEATERS
Wherever You Go

It makes no difference where you are—on one of the famous automobile rows, or in sales rooms of dealers—you find UTILITY Protected Heaters prominently displayed in windows and show cases wherever you go, usually without competition, as the representative exhaust type heater for gasoline driven motor cars.

On the opposite page is reproduced an editorial layout from the 1919 Winter Service Number of Motor Age, the maintenance and service authority of the automotive industry.

It tells the story true and well. In every one of these typical winter sales making displays — selected by unprejudiced editors who know—UTILITY Protected Heaters abound.

Get UTILITY Protected Heaters on your counters and in your windows. Put them where they show.

If the demand for them is a whopper in November—and it is —what will it be in **December** and **January** and **February** and **March**, when the weather is really cold?

Ask jobbers and dealers who stock UTILITY Protected Heaters. **They'll** tell you how they sell.

Dealers:—Order from your jobber NOW. **Jobbers:**—Get in touch with us.

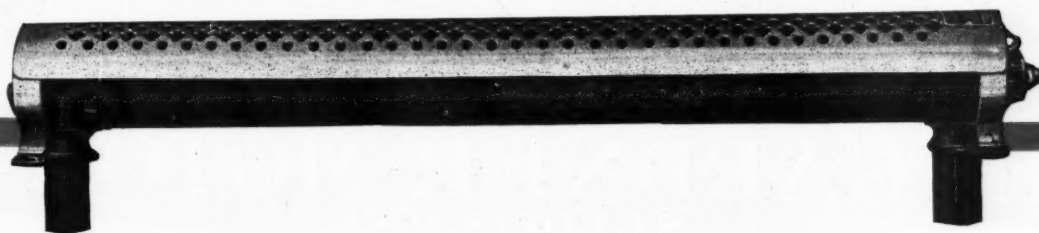
HILL PUMP VALVE COMPANY

Mfrs. of UTILITY Protected Heaters, UTILITY Pedals for Fords, UTILITY Pumps, UTILITY Universal Rim Wrenches and UTILITY Universal Wrenches

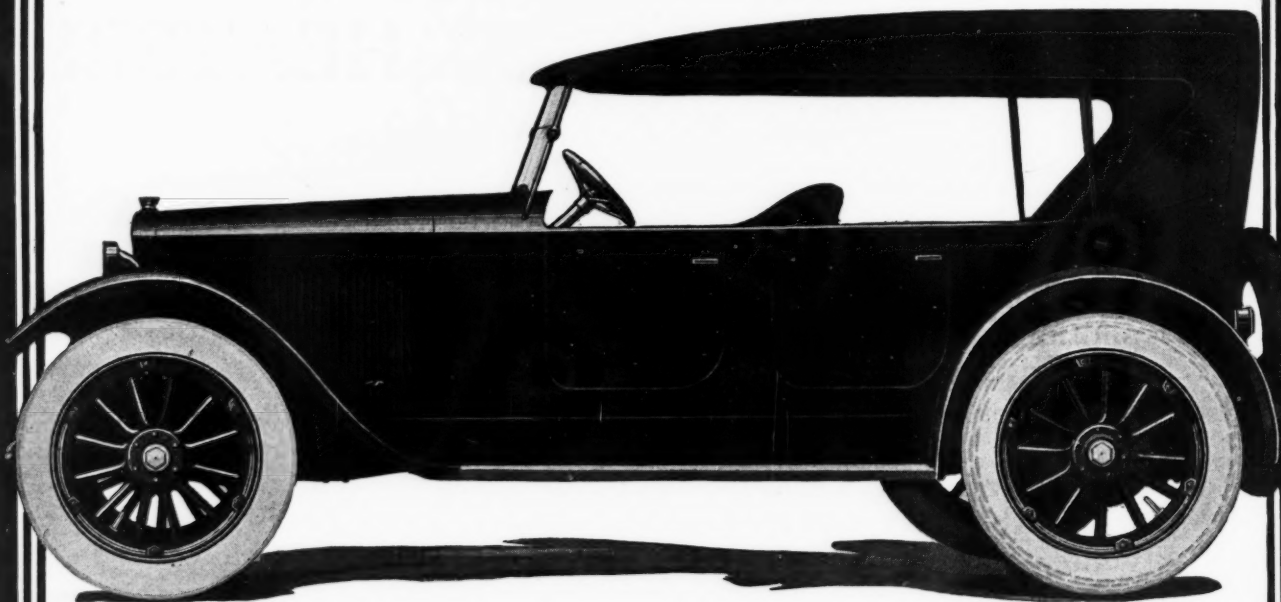
Archer Avenue and Canal Street, CHICAGO

Sales Department:

THE ZINKE CO., 1323 S. Michigan Ave., Chicago



COMING!



\$1125.00

THE LAST WORD IN MOTORDOM



"IT SPEAKS FOR ITSELF"

THE GARDNER MOTOR CO.
ST. LOUIS, U.S.A.

BERGOUGNAN TIRES

THE TIRE WITH THE DOUBLE GUARANTY

We not only guarantee 6,000 miles for fabric tires and 8,000 miles for cord tires but we give each buyer of one of our tires a signed certificate of the National Surety Co. to the effect that this guarantee will be lived up to.

No other tire manufacturer arms his dealers with such a sure-fire sales-help as this.

Write to the firms listed below and get them to tell you what this feature of our selling policy is doing for them.

C. J. Van Houten & Zoon, Illinois Distributors,
140 So. Dearborn St., Chicago.

CALIFORNIA DISTRIBUTORS:

Haldeman Tire Co., 841 So. Los Angeles St., Los Angeles.

Haldeman Tire Co., 700 Van Ness St., San Francisco.

K. B. Auto Supply Co., New Jersey Distributors,
117 E. Hanover St., Trenton.

Hardwicke-Etter Co., Texas Distributors,
Sherman, Texas.

Hamilton Motor Co., Western Pennsylvania Distributors,
Ben Avon, Pa.

Seaboard Tire & Rubber Co., Maryland Distributors,
133 W. Mt. Royal Ave., Baltimore.

BERGOUGNAN RUBBER CORP.

TRENTON, N. J.

BRANCHES

New York—49 West 64th St.
Montreal—325 St. James St.

Philadelphia—1404 W. Girard Ave.
Toronto—496 Yonge St.

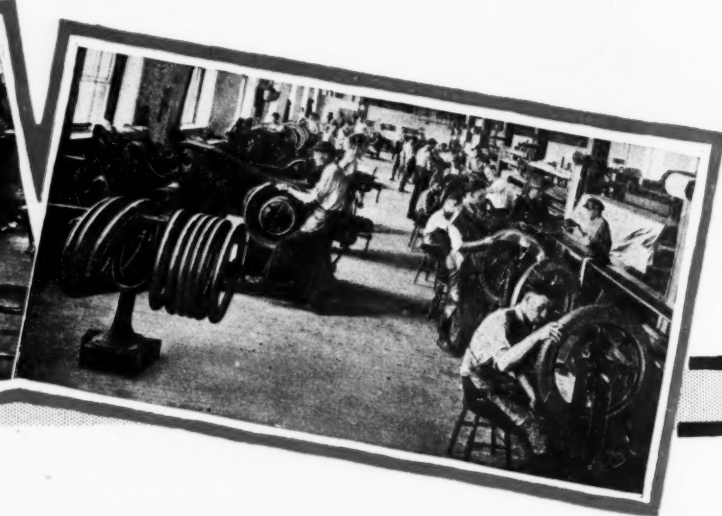
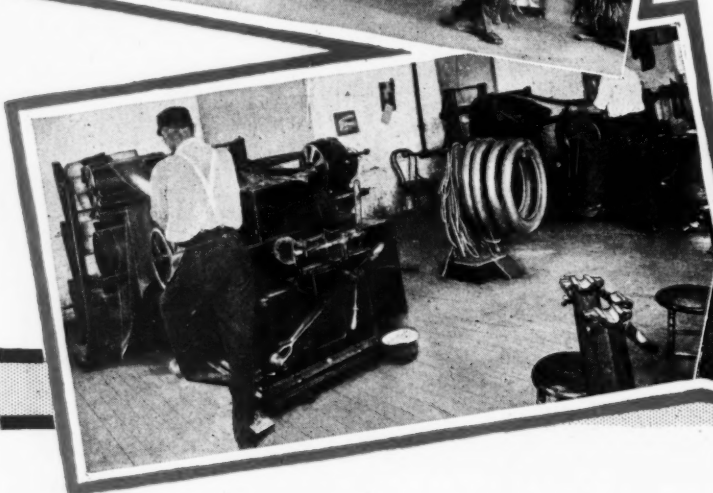
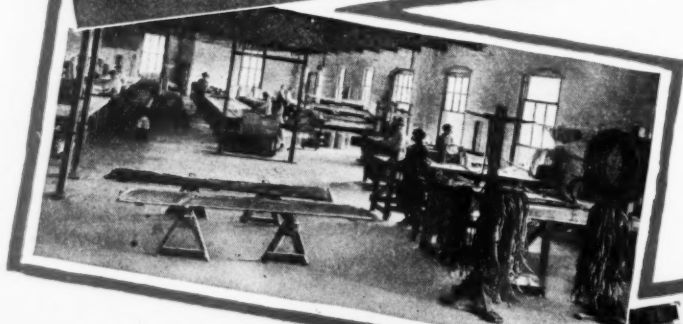
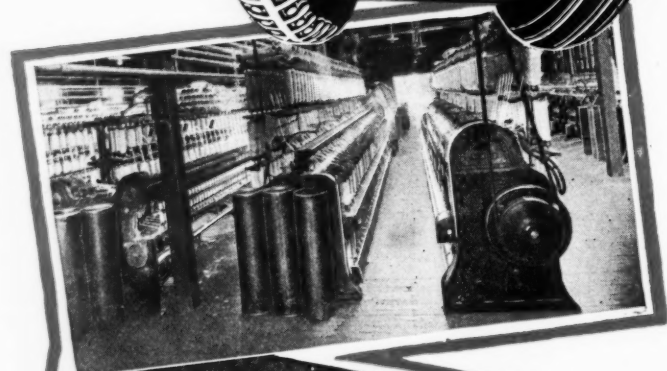


TRUE



TEN BROECK "Thoroughbred" Tyres are made in a factory superbly equipped for the speedy, efficient, production of quality tyres. In every detail of layout and equipment the TEN BROECK factory represents the latest improvements, and accepted standards in the tyre making industry. As an instance of TEN BROECK completeness, this company is one of less than a dozen American tyre and rubber companies having its own cotton mills located on its own premises.

Such a factory permits of the very lowest production costs—enormous savings which are put back into the tyre in the shape of "better-than-usual" quality.



TEN BROECK

THOROUGHbred TYRES

8000 MILES

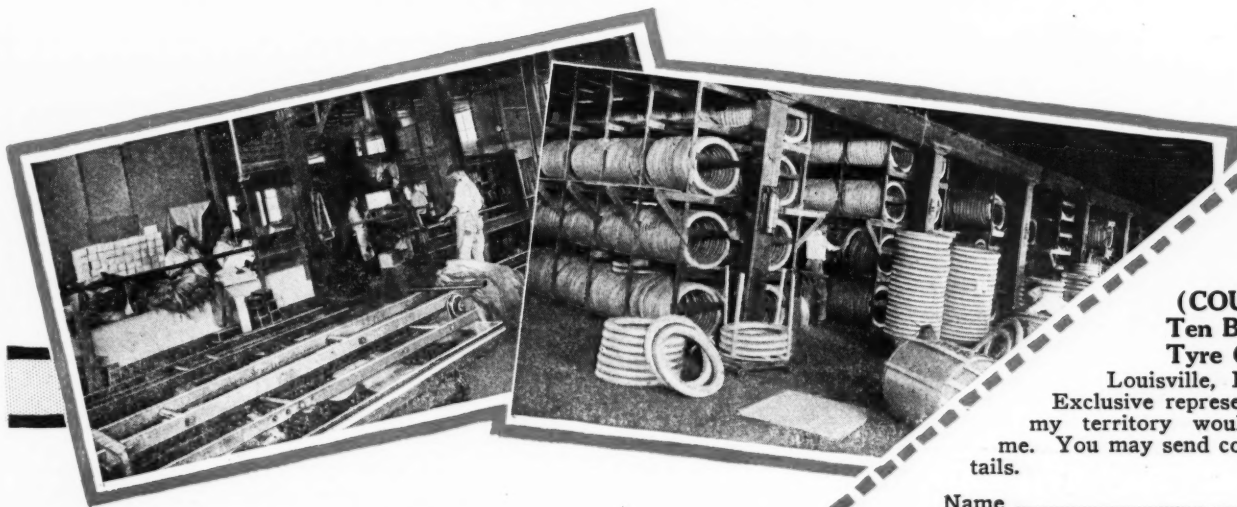
For *one* dealer in every locality throughout the country we have a selling plan based on exclusive representation—but the men we select will be men who can assume responsibilities and keep in step with the quickening march of a big idea.

TEN BROECK dealers themselves make all adjustments. Doesn't that indicate a strong vein of confidence running through the TEN BROECK organization? And doesn't it indicate clearly the type of men we wish to do business with?

TEN BROECK dealers are not left alone upon a sea of troublesome selling problems with a slap on the back and a hearty "go to it!" TEN BROECK dealers are part—and a mighty important part — of the TEN BROECK organization. Upon their measure of success hangs our chance of a winning race. With this in mind we back them up to the fullest extent—we give them the kind of cooperation that brings in the business and *holds it*.

If you are the TEN BROECK type of dealer—if the opportunities of a "no limit" selling plan are sharp and clear in your mind — then wire, telephone, write or come to the factory. If you're the man, we ought to get together.

Ten Broeck Tyre Co.
Louisville, Kentucky



(COUPON)
Ten Broeck
Tyre Co.

Louisville, Kentucky
Exclusive representation in
my territory would interest
me. You may send complete de-
tails.

Name

Address

HAYNES CHARACTER CARS BUILD DEALER'S REPUTATION



HE pronounced success of the Haynes is more than popularity. It is acceptance by the car-user of the value of the four essential factors of character—beauty, strength, power and comfort—which are combined in the Haynes.

The good repute of the past twenty-six years has been crystallized into a solid foundation of good will. This is worth vastly more to us than any other testimonial to the excellence of the Haynes—the car of character.

This public good will and confidence naturally benefits every Haynes dealer. The record of the Haynes this year alone is a tangible asset to every dealer who has handled our cars.

We are now completing our alignment of dealers for the coming year's business. In some sections we will discuss establishing new dealer connections.

Should you feel that you are entitled to be among the Haynes dealers whose reputations are being so greatly strengthened by the public opinion of America's First Car, please write or wire us for an interview.

In writing or wiring, Address Dept. 1151

The Haynes Automobile Company, Kokomo, Ind., U.S.A.

The Haynes, AMERICA'S FIRST CAR, now exhibited by the government at the Smithsonian Institution, Washington, D. C., was invented, designed and built by Elwood Haynes, in 1893.



1893 — THE HAYNES IS AMERICA'S FIRST CAR — 1919



Sterling Spark Plugs

As sure, as unfaltering as the tick of the clock, Sterling Spark Plugs deliver ignition that means full power in every cylinder.

In congested business districts, on main city thoroughfares, on interurban highways, Sterling quality has measurably added to the success and economy of "Ship by Truck."

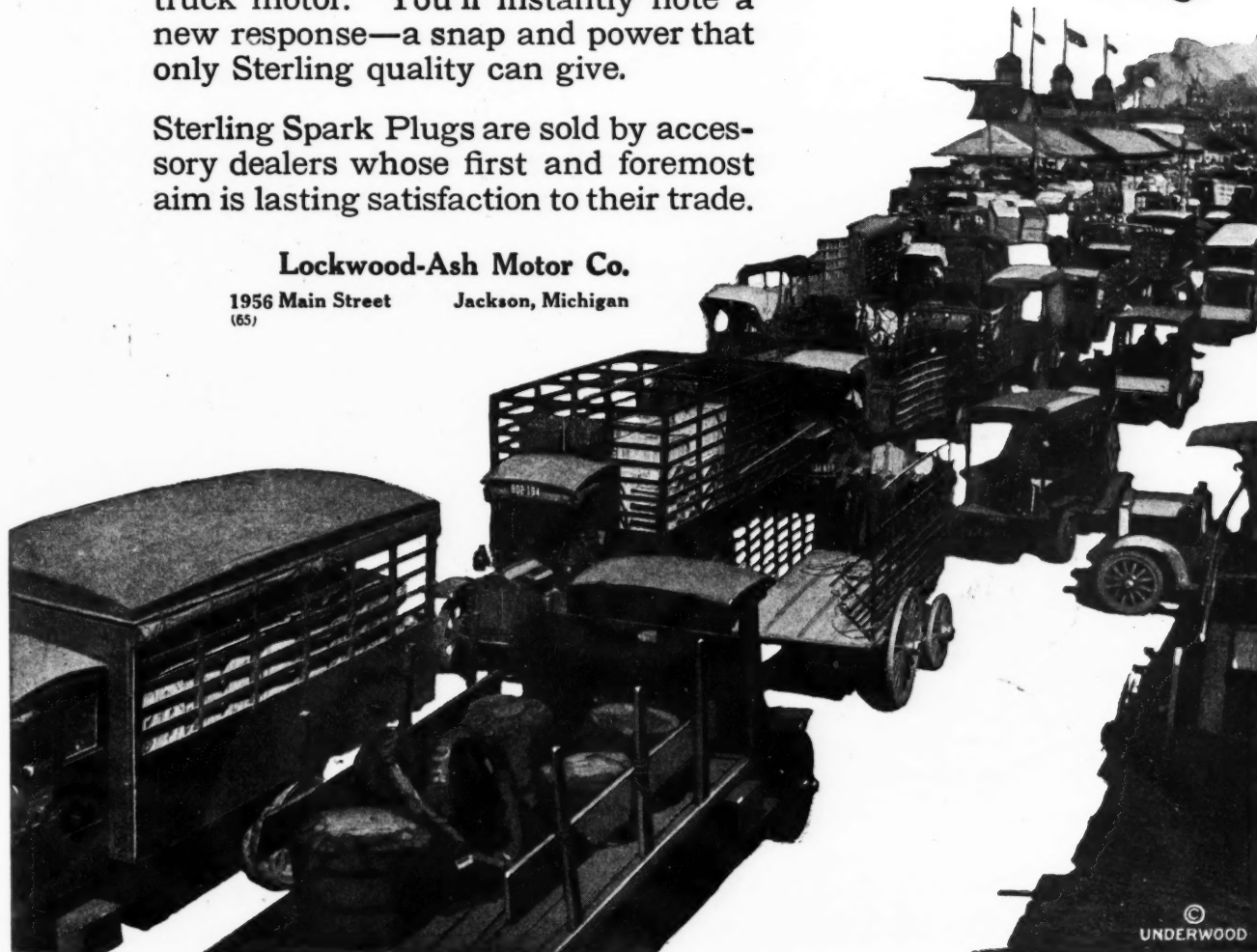
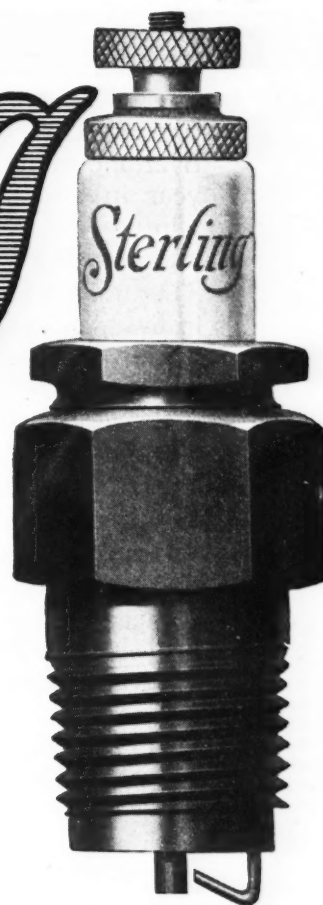
Put a set of Sterling Plugs in *your* truck motor. You'll instantly note a new response—a snap and power that only Sterling quality can give.

Sterling Spark Plugs are sold by accessory dealers whose first and foremost aim is lasting satisfaction to their trade.

Lockwood-Ash Motor Co.

1956 Main Street
(65)

Jackson, Michigan



©
UNDERWOOD

Over all kinds of roads, city and urban, over mountains and through valleys, year in and year out, summer and winter—WOOD Wheels carry you and the car weight.

They absorb thousands of road shocks in every mile traveled—shocks which if not absorbed would damage your wheel bearings, or if transmitted to the axle-housings would soon cause crystallization.

Your faithful servants—WOOD Wheels.

Seldom do you even give them a thought and never do they need attention.

This is another reason why WOOD Wheels have been used for years and will continue to be used on the world's best cars.

AUTOMOTIVE WOOD WHEEL
MANUFACTURERS' ASSOCIATION
105 West Monroe Street Chicago, Ill.

Your faithful servants

NOTE THE
WOOD WHEELS
EVERYWHERE

WOOD WHEELS

for MOTOR
VEHICLES

*Truck Dealers--
make a profit on the
body--and the truck.*



Every motor truck must have a body—therefore every truck you sell is a means of added profit.

The dealer who has the agency for Dailey Bodies—wood and steel—can equip every truck he sells with the proper type of body in the shortest possible time.

Our organization has solved the haulage problems of every business—we make truck bodies to fit every requirement.

A large stock of standard bodies and hoists always on hand. We can make immediate shipments, or build a special body in record-breaking time.

Don't lose a profit that could and should be yours,—
sell a body with every truck.

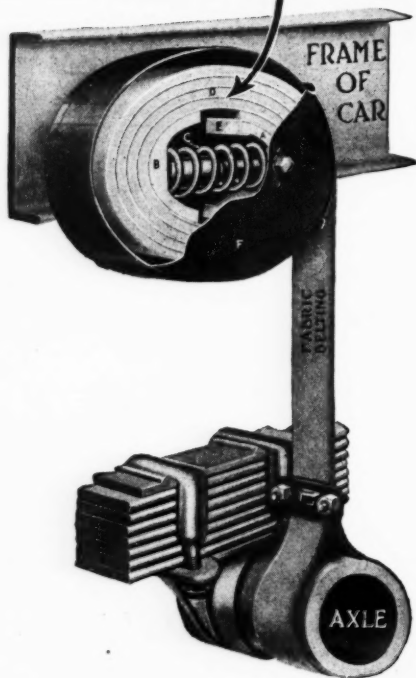
*Write for dealer offer and full
information about Dailey Bodies.*

H. R. DAILEY, Auto Truck Steel Body Co.
3028 Carroll Avenue **Chicago**

Steel and Wood Body Distributors

Auto Truck Steel & Wood Body Co., 1815 N. 23d St., St. Louis, Missouri.	Troy Trailer Co., 5 North 21st St., Philadelphia, Pa.
Auto Hoist & Body Co., 18 Bainbridge Street, Brooklyn, N. Y.	Thomas & Company, Braddock Avenue, near Forbes St., Pittsburgh, Pa.
Simplex Commercial Body Co., 1170 Jefferson St., Buffalo, N. Y.	Simplex Mfg. Co., Conneautville, Pennsylvania.
The Truck Engineering Co., 3553 Cedar Avenue, Cleveland, Ohio.	The John Immel & Sons Co., Columbus, Ohio.
Hydraulic Hoist Mfg. Co., 715 Lorraine Avenue, Detroit, Mich.	Springfield Commercial Body Co., 385 Liberty Street, Springfield, Massachusetts.
Auto Hoist & Body Co., 333 Avenue B, New York City, N. Y.	Springfield Commercial Body Co., Cambridge, Mass.

DAILEY MOTOR TRUCK BODIES

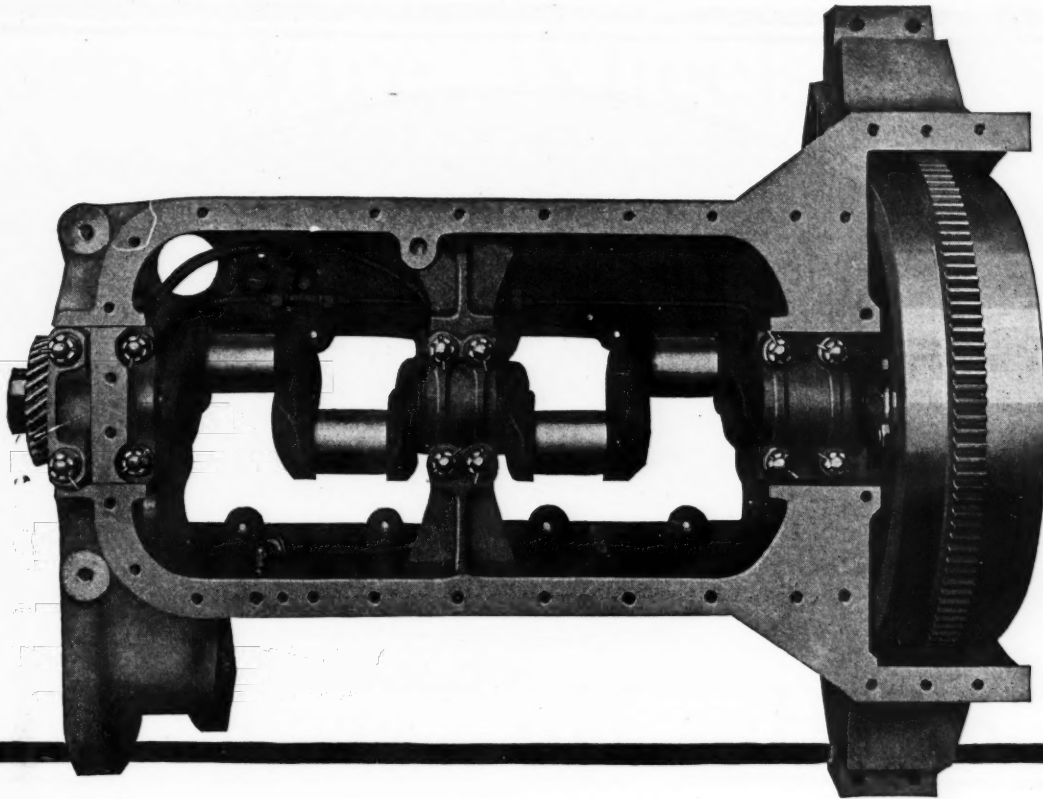


Everybody is
Using Snubbers

GABRIEL MANUFACTURING COMPANY
1415 E. 40th St. Cleveland, Ohio

GABRIEL
SNUBBERS

Make the Car Ride Easier and Last Longer



Model "AA" 3¾x5 in.

How the Crankcase Looks Inside

IMPORTANT FEATURES ARE:

Weight complete, 425 lbs.
Crank case of LYN-
ITE.
Semi-steel cylinders.
Bronze back, babbitt
shell lined bearings.
All materials S. A. E.
specifications.
Hot Spot Ram's Horn
manifold.
Enclosed valves.
Three Point Suspension.
Maximum Accessibility.
S. A. E. Mountings
Carburetor can be at-
tached to either side.
Helical Cut Timing
Gears.
Oil filtered and cooled.

This illustration tells its own story of simple, clean design.

Note the oil leads thru which oil is forced to all bearings under pressure. The Crankshaft is drilled thru the cheeks to the crankpin which is drilled to feed the oil to the lower connecting rod bearing.

Note the sturdy three bearing Crankshaft. It is 2¼" diameter, front bearing is 3", center bearing 2½" and rear bearing 3" long. Note the splendid support given center bearing by the heavy ribs—stiffness and continuity of alignment are assured. But no mere illustration can convey any real vision of the real character of this 3¾x5-inch motor.

Its powerfulness, its smoothness, its amazing flexibility and freedom from vibration cannot be pictured.

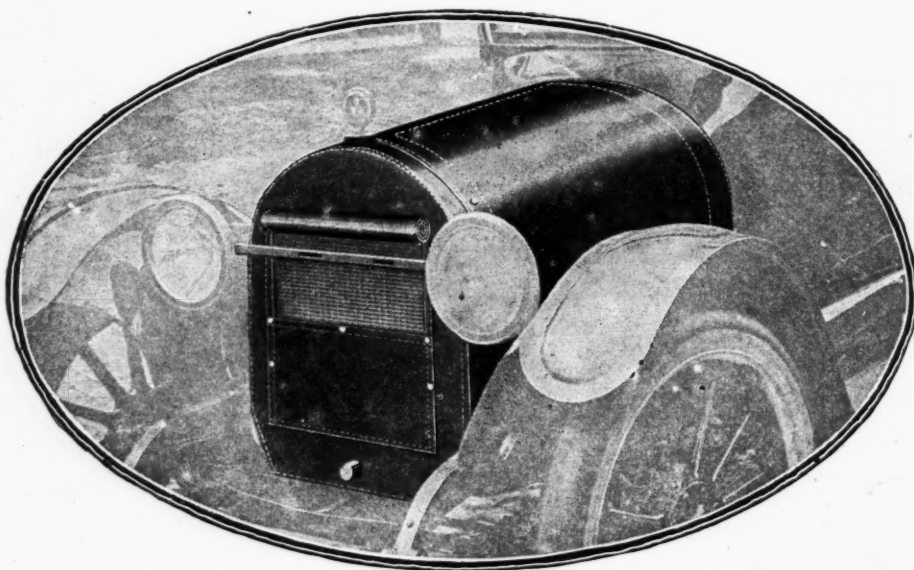
But they are quickly revealed on test.

If you are considering the possibilities for 1920 and want a motor that you can absolutely back as a superfine four, it will pay you to get in touch with us immediately.

GOLDEN, BELKNAP & SWARTZ CO.,
DETROIT, U. S. A.

Export Dept.—100 Broad Street, New York. London—Paris

G-B&S motors



Cold Has No Terrors For Well Protected Motors!

MOTORS kept warm run better, burn less gasoline, have more power, and give less trouble! Protects the battery from excessive drain when starting. Motor car owners have learned that this is true. They are buying hood and radiator covers as a

matter of economy. "Baker" Hood and Radiator Covers are easy to sell because they are better—made of better quality materials in all sizes, and cut to fit perfectly. Live dealers everywhere are making money with "Baker" Hood and Radiator Covers.

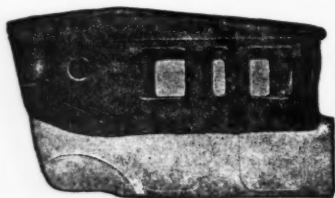
We also have ready for delivery many other popular "Baker Necessities", such as "Over the Top" Auto Tops, Anti-Draft Shields, Foot Pedal Shields, Bad Weather Mats, Rain Guards, Etc.

BAKER AND LOCKWOOD MANUFACTURING CO.

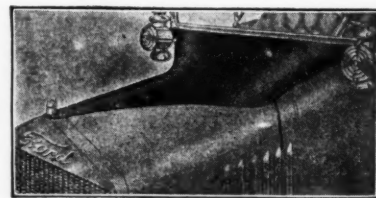
BROOKLYN, N. Y.
473 Kent Avenue

KANSAS CITY, MO.

CHICAGO, ILL.
3021-23 Michigan Ave.

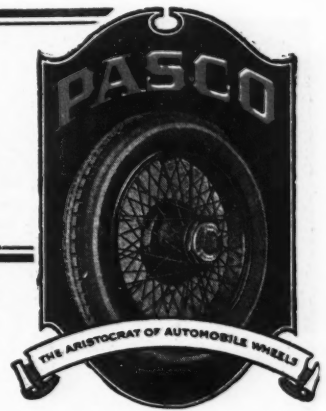


"Over the Top" Auto Tops make a warm sedan from an open car. Installed easily and quickly.



"Baker" Rain Guards for Fords protect the wiring from rain dripping through.

Pasco Wire Wheels Are Easily Sold



Here are the arguments with which you can convince motorists of the value of Pasco wire wheel equipment:

Pascos are five times as strong as wood wheels.

They are lighter, more resilient and hence more economical with tires.

They are interchangeable with wood wheels without altering the standard 56" tread—the

tread for which the car was designed. The maintenance of standard tread saves tires when driving on rutty road.

The Pasco method of spoke lacing besides affording great strength, gives unusually high curb clearance and easy access to the valves. The spokes themselves are heavy and resist damage.

Each Pasco is perfectly balanced and absolutely trued by a special truing machine used only in the Pasco plant. This fact protects tires from excessive wear of a type on which adjustments are not allowed.

Pasco Wire Wheels can be detached and replaced in less than three minutes. They are made absolutely safe from running off by a double lock nut with right and left hand threads. There are no parts to break and no wear on threads. The hub cap is indestructible.

Finally, Pasco Wire Wheels are exceptionally beautiful. Their heavy spoke lacing and massive hubs give a car a low-hung, well-set appearance. People choose Pascos for the individuality and distinction they give to their cars.

And don't forget the small-car Pasco—the wheel that fits Fords, Chevrolets 490's and Overland Model 4's—offering the biggest possible market with the smallest stock. These wheels have the same exclusive features of the larger Pascos.

Write us about Pascos.

NATIONAL WIRE WHEEL WORKS, Inc.

Factory: Hagerstown, Md.

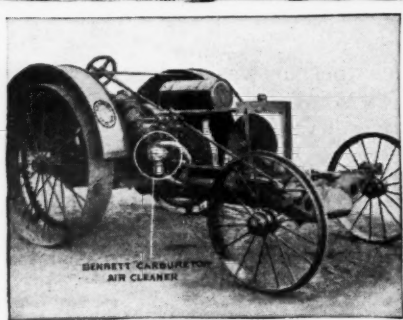
Gen. Offices: 416-417 Book Bldg., Detroit, Mich.

NORTHERN ELECTRIC CO., LTD., Montreal, Canada

PASCO WIRE WHEELS

Bennett

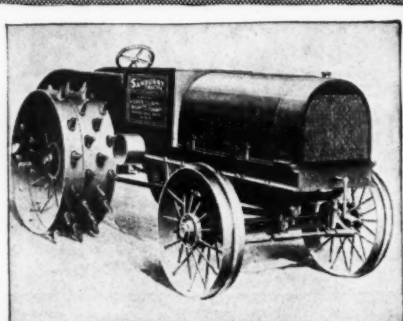
Tractor Equipment



La Crosse Tractor



Aultman-Taylor Tractor



Sandusky Tractor

Where Reliability Comes First

IN the tractors where reliability and dependability are first considerations, there you will find Bennett Equipment.

The Bennett Kerosene Carburetor has been building success for tractor manufacturers. It is the carburetor which has actually solved the problem of successful kerosene operation.

The life and reputation of a tractor depends upon keeping dust and dirt out of it. The Bennett Carburetor Air Cleaner removes all dust and dirt from the air before it enters the carburetor. It lengthens the life and efficiency of tractors.

Study the names of tractor manufacturers using Bennett Equipment. They represent almost the entire tractor industry.

WILCOX-BENNETT CARBURETOR COMPANY

Specialists in Kerosene Carburetors

MINNEAPOLIS

MINNESOTA

Study This List of Tractor Manufacturers Specifying Bennett Equipment

Allis-Chalmers Mfg. Co.
Amer. Eng. & Trac. Co.
Appleton Mfg. Co.
Aulson Tractor Co.
Aultman-Taylor Co.
Automotive Corp.
Avery Company
Baker Tractor Co.
Beltrail Tractor Co.
Besser Mfg. Co.
Best, C. L., Co.
Bethlehem Motors Co.
Blumberg Motor Mfg. Co.
Boring Tractor Co.
Buckeye Mfg. Co.
Buckeye Traction Ditcher Co.
Bullock Tractor Co.
Chase Motor Truck Co.
Coleman Trac. Corp.
Columbus Tractor Co.
Craig Tractor Co.
Dart Tractor Co.
Dauch Mfg. Co.
Dayton-Dick Co.
Detroit Tractor Co.
Downes, F. J., Co.
Eagle Mfg. Co.
Electric Wheel Co.
Elgin Tractor Corp.
Emerson-Brantingham Co.
Engel Aircraft Co.
Fageol Motors Co.
Farquhar, A. B., Co.
Four-Drive Trac. Co.
Frick Company
Galloway Company
Gile Trac. & Eng. Co.
Gilson Tractor Co.
Goold, Shapley & Muir Co.
Gray Trac. Co., Inc.
Great West. Trac. Co.
Hession Tractor Co.
Huber Mfg. Co.
Illinois Tractor Co.
J. T. Tractor Co.
Joliet Oil Trac. Co.
Kansas City Hay Press Co.
Kardell Tractor Co.
Keck-Gonnerman Co.
Kohl Tractor Co.
La Crosse Trac. Co.
Lang Tractor Co.
Leyner, J. Geo., Co.
Los Angeles Trac. Co.
Massey-Harris, Ltd.
Mpls. Steel & Mch. Co.
Moline Plow Co.
Monarch Tractor Co.
Monarch Tractor Co., Ltd.
National Tractor Co.
Nilson Tractor Co.
Ohio General Tractor Company
Ohio Mfg. Company
Oliver Tractor Co.
Peoria Tractor Co.
Pioneer Tractor Co.
Post Tractor Co.
R. & P. Tractor Co.
Reed Fdry. & Mch. Co.
R. L. Plow Co.
Royal Motors Co.
Russell & Company
Savidge Tractor Co.
S. W. H. Eng. Co.
Square Turn Trac. Co.
Star Tractor Co.
Strite Tractor Co., Inc.
Topp-Stewart Tractor Co.
Traction Motor Co.
Turner Mfg. Co.
Union Tool Co.
U. S. Tractor Co.
United Tractor Co., Inc.
Velle Motors Corp.
Wallis Tractor Co.
Wichita Tractor Co.
Wisconsin Trac. Co.
Yuba Mfg. Company

CARRIES THE LOAD

TAKES THE THRUST

THRUST STRAINS ARE NULLIFIED IN THE SAME WAY

*Make Child's Play
ANYWHERE
of Load and Thrust*

WHEEL Flanges easily and safely handle the tremendous thrust strains developed by pounding locomotives and long, heavy, swaying trains.

BOWER ROLLER BEARINGS utilize the same flange principle in guiding the bearing rolls in the raceways and absorbing thrust strains.

BOWER

ROLLER BEARING CO.
Detroit Michigan



Nearly 2300 USL Service Stations and Dealers. A nation-wide service.

You are Protected by USL Service Station Standards

USL Service Stations do more than merely examine your battery-connections, take hydrometer readings and add water if needed.

These Stations everywhere are governed by the USL high standards of practice.

If you need a new battery, any USL Service Station will sell you a USL "Dry-Charged" battery whose life begins the day it goes into your car. It will be neither shelf-worn nor shop-worn. It will contain the *exclusive USL machine-pasted plates*, making it possible to sell the battery on the guaranteed adjustment plan.

You can depend upon any USL Service Station and dealers in your own town, and in nearly 2300 others throughout the land.

THESE ARE OUR INSTRUCTIONS TO USL SERVICE STATIONS

Do not sell a *new* battery if you can give the owner better value by repairing his *old* one.

Give an eight months' guaranty covering every repair.

If a repair cannot be guaranteed, do not make it and show the owner why.

Supply for replacement the exact size and type of battery designed to go in the car.

Before making a repair or placing a new battery in a car, check up the operation of the other electrical units. You are responsible to the owner for satisfactory operation of the battery regardless of conditions outside of it.

Remember that your job is to render *dependable service*, and that "the longer you can make the *old* battery last, the surer you are of eventually selling the owner a *new* one."

U. S. LIGHT & HEAT CORPORATION

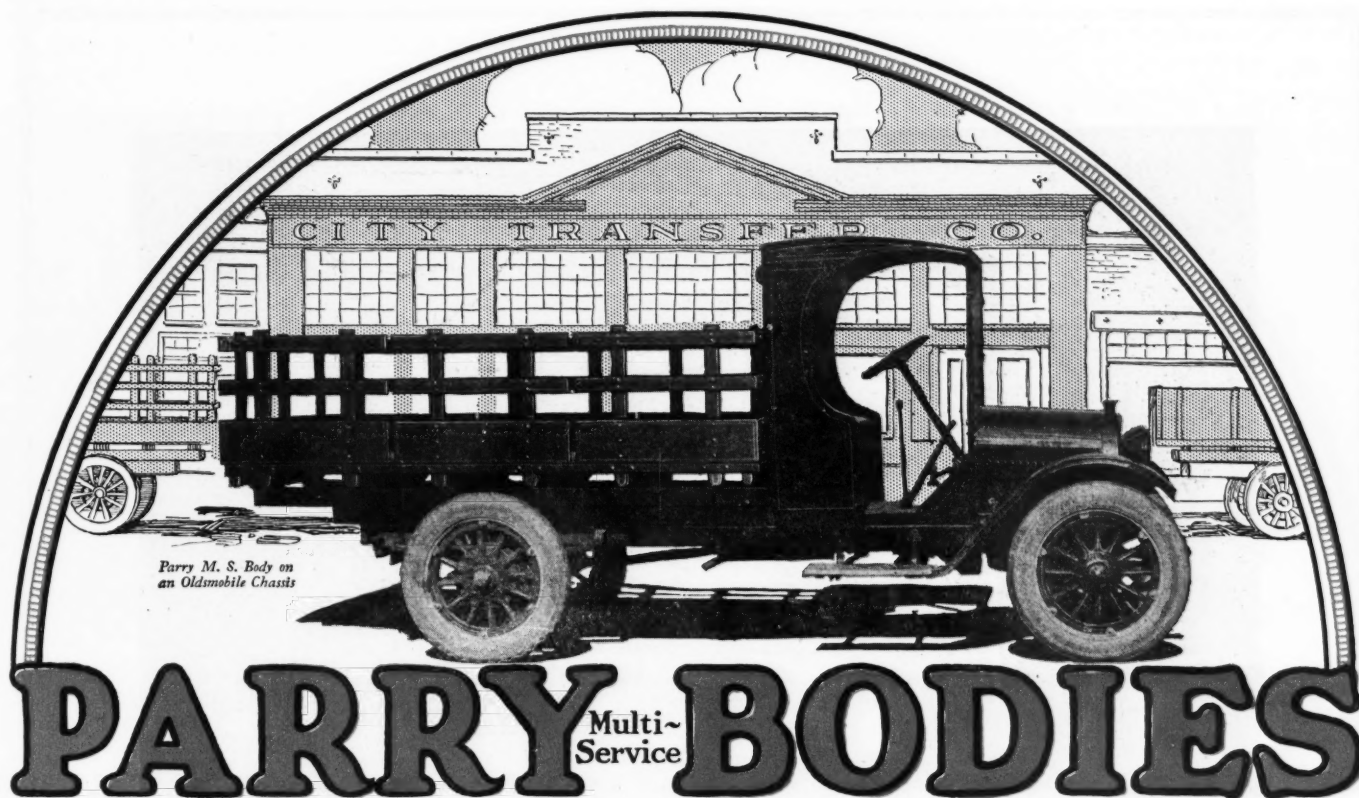
Niagara Falls, N. Y.



TRADE
MARK

FREE Our 50-cent Battery Book that answers every battery question. It's a book you can't afford to be without if you own or drive an automobile. It's free if you mention the make and model of your car.

storage batteries



For All Truck Chasses OF 1 TON TO 2½ TON CAPACITY

Parry M. S. Bodies are designed by the country's leading body specialists—men who know the exact body requirements of every truck chassis and every hauling need. Built in the world's largest commercial body factory, where none but best materials are used, and highest quality standards are maintained. Big quantity production and standardized designs insure you better bodies at lower costs.

With their convertible features—stock racks, express panels, stake sides, all interchangeable on one platform—Parry M.S. Bodies meet all the needs of truck buyers.

In use by progressive farmers, wholesale and retail merchants, manufacturers, contractors and hundreds of others, trucks equipped with these bodies are making new records for economical service—helping to reduce trucking costs, speeding up delivery schedules and hauling larger loads with greater ease of handling.

No matter what make of truck you sell, this line of bodies offers unequalled opportunities for you to increase your body profits, with little additional stock or sales expense. Let us show you how.

Martin-Parry Corporation

Martin Plant
York, Pennsylvania

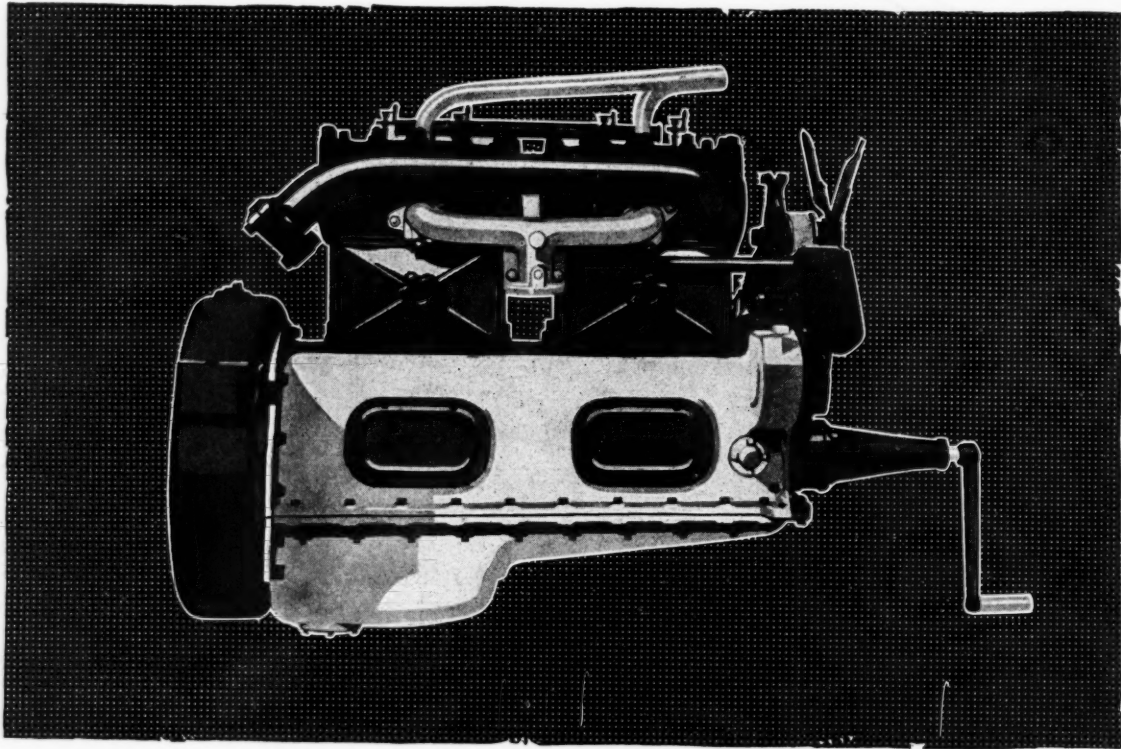
Indianapolis, U. S. A.

Parry Plant
Indianapolis, Ind.

*The largest makers of commercial
bodies in the World.*

THREE Types of Truck Bodies
Interchangeable on ONE Platform





Waukesha
TRADE MARK

HIGH TORQUE MOTORS

(Maximum Pull at Low Speed)

*Built to meet a
National Need*

Tractors and Trucks are vital growing parts of the nation's productive and distribution system—and just as vital to the individual tractor or truck is the motor it is equipped with.

Waukesha Motor performance is the direct result of strict adherence to the High Torque principle of construction.

A principle that has particular significance to every owner of automotive equipment.

For against a heavy pull at low speed the engine of low torque will invariably kill.

Because of this, there is a steadily increasing demand, in all parts of the country, for tractors and trucks that are Waukesha powered.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.

The World's Largest Builders of Tractor and Truck Motors Exclusively

THE average car tool kit is a joke except when you need to use it—and then it's a tragedy.

There are, however, some wise car makers who equip their cars with good tools—and you know what it means to you when you enjoy the service of such kits.

The Billings & Spencer Company are wrench makers and have been preeminent in this field for fifty years. Manufacturers the world over recognize Triangle B as the standard for quality.

That little mark says "Rely on me. I am made as well as I can be made. I shall not fail."

A dealer or a garage man without B. & S. wrenches is almost a curiosity, for satisfied customers are their biggest asset—and the most satisfaction comes from using tools that make good where the service is the hardest.

HARDMAN

INNER TUBES

Ready for Immediate Shipment in Quantities

THE Tube Capacity of the Hardman Factory has recently been very materially increased. This condition substantially relieves the pressure. Where territory is open we are ready to contract with Distributors and Dealers for immediate shipments in any quantity. This announcement represents a conspicuous opportunity.

Hardman Tubes have won their way to an established position.

Hardman Tubes are so constructed that they cannot warp, bulge or otherwise lose shape.

Hardman Tubes cannot leak at valve space or splice.

Hardman Tubes are of highest quality and every tube is inspected and carefully tested before packing for shipment.

Hardman Tubes possess lasting vitality and are especially adapted for service with Cord Tires.

Hardman Tubes carry an unqualified guarantee against defects and deterioration for one year.

Current Price List

Subject to change without notice, published herewith

Size	Red	Gray	Size	Red	Gray	METRIC SIZES		
28x2½	\$2.90	\$2.55	35x4	\$6.20	\$5.40	Size	Red	Gray
28x2¾	3.15	2.75	36x4	6.30	5.50	760x 90	\$4.45	\$3.95
28x3	3.55	2.90	32x4½	7.10	6.10	815x105	6.00	4.95
30x3	3.65	3.00	33x4½	7.30	6.15	875x105	6.35	5.25
32x3	3.80	3.20	34x4½	7.50	6.25	915x105	6.60	5.60
34x3	3.90	3.40	35x4½	7.70	6.45	820x120	8.10	6.25
30x3½	4.15	3.50	36x4½	7.90	6.65	880x120	8.40	6.50
31x3½	4.40	3.60	37x4½	8.35	6.90	920x120	8.80	6.85
32x3½	4.50	3.75	38x4½	8.70	7.15	895x135	10.85	9.00
34x3½	4.80	3.95	33x5	8.50	7.70	935x135	11.00	9.45
31x4	5.65	4.75	34x5	8.60	7.75	GIANT RED TUBES		
32x4	5.80	4.85	35x5	8.75	7.80	36x6	\$16.20	
33x4	5.90	5.00	36x5	9.15	8.00	38x7	21.40	
34x4	6.00	5.15	37x5	9.25	8.10	40x8	27.70	

HARDMAN RUBBER CORPORATION

STANWOOD

NEW BRUNSWICK . . . N.J.

Executive Offices:
9 East 40th Street
New York



*For Every Load
and Every Road*

CLASS OF SERVICE	SYMBOL
Telegram	Blue
Day Letter	Nite
Night Message	N L
Night Letter	N L

If none of these three symbols appears after the check (number of words) this is a telegram. Otherwise its character is indicated by the symbol appearing after the check.

WESTERN UNION TELEGRAM

NEWCOMB CARLTON, PRESIDENT

GEORGE W. E. ATKINS, FIRST VICE-PRESIDENT

CLASS OF SERVICE	SYMBOL
Telegram	Blue
Day Letter	Nite
Night Message	N L
Night Letter	N L

If none of these three symbols appears after the check (number of words) this is a telegram. Otherwise its character is indicated by the symbol appearing after the check.

RECEIVED AT 121 SOUTH 10TH ST. TERMINAL BLDG., LINCOLN, NEB. ALWAYS OPEN
C55 OM ND 50 N L FT WORTH TEX OCT 9 1919

473

HEBB MOTORS COMPANY
LINCOLN NEBRASKA

THE WONDERFUL PERFORMANCE OF PATRIOT TRUCKS IN TEXAS HAS BEEN SO UNUSUAL THAT OUR PRESENT SCHEDULE OF SHIPMENTS ARE DECIDEDLY INADEQUATE YOU HAVE RECEIVED OUR ORDERS IN THE PAST THREE WEEKS FOR SOME TWENTY CAR LOADS OF TRUCKS AND WE ESTIMATE OUR FUTURE NEEDS AT ONE HUNDRED TRUCKS PER MONTH

THOMAS PEASE MOTOR CO

440 AM OCT 10

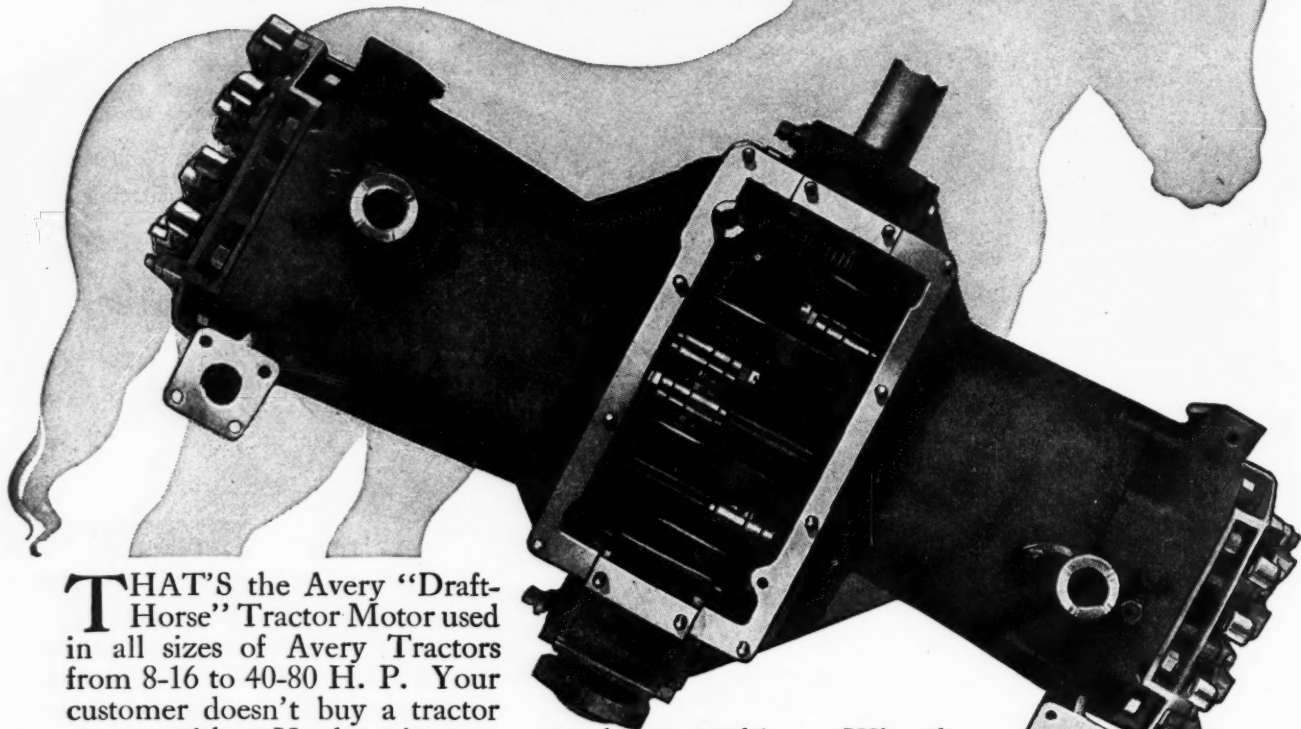


PATRIOT



Manufactured by HEBB MOTORS CO., 1391 P St., Lincoln, Nebraska

Built Like a Draft Horse for "Draft-Horse" Work



THAT'S the Avery "Draft-Horse" Tractor Motor used in all sizes of Avery Tractors from 8-16 to 40-80 H. P. Your customer doesn't buy a tractor to race with. He doesn't want a race-horse machine. What he does want is a power plant that will deliver a good, dependable amount of power day after day without stalling under heavy loads.

The Avery "Draft-Horse" Motor was designed *especially* for tractor work and *exclusively* for Avery Tractors. It is not an automobile type adapted to a tractor, but it is a *thoroughbred* heavy duty power plant.

It works at low speed. This means less gears needed between the motor and the drawbar. Avery design takes advantage of this with the "Direct-Drive" Sliding Frame Transmission—gives direct drive in high, low, reverse or in the belt. Only three gear contacts used in drawbar work, and no gears whatever for belt work.

The low speed motor, with a large belt pulley right on the end of the crankshaft, makes the Avery the ideal power plant for belt work.

Features That Make Sales

There are good reasons why Avery dealers have been kept busy all spring and summer delivering machines. Ask any Avery owner why he bought his machine. See what he thinks about his "Draft-Horse" Motor, "Direct-Drive" Transmission, Renewable Cylinder Walls, Two-Bearing Crankshaft, Adjustable Crankshaft Boxes, Kerosene Gasifiers, Round Radiator, etc.

Then you'll want to find out if the Avery Agency is still open in your territory for 1920. We will be glad to tell you.

There's a Size Avery Tractor for Every Size Farm

The Avery Agency gives you the sale of six sizes of Avery Tractors—8-16, 12-25, 14-28, 18-36, 25-50 and 40-80 H. P.—the special 5-10 H. P. Avery Tractor, the Avery Motor Cultivator and the Champion Avery Grain-Saver Threshers and Plows to fit any size tractor.

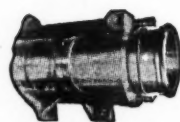
EVERY COMPANY: Factory and Main Office, Peoria, Ill.

Branch Houses: Madison, Fargo, Omaha, Minneapolis, Grand Forks, Sioux Falls, Aberdeen, Billings, Lincoln, Des Moines, Indianapolis, Columbus, Kansas City, Wichita

Distributors: AVERY COMPANY OF TEXAS: Dallas, Amarillo and Beaumont, Texas
Also Other Principal Machinery Centers

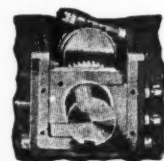
AVERY

**Motor Farming, Threshing
and Road Building Machinery**

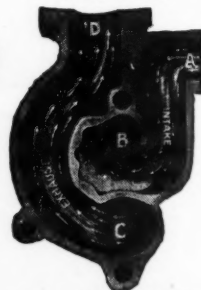


**Avery Renewable
Inner Cylinder
Wall**

Can be turned as it wears and replaced if ever necessary—saves expense of buying complete new cylinders.



**Avery Adjustable
Crankshaft**
Easily adjusted with
socket wrench.



Avery Duplex Gasifier
Turns kerosene into gas.

If after 30 days your
customer is dissatisfied with

H&D
SHOCK ABSORBERS
Single or Twin Arm

he may return them and have his
money refunded. We will send you
a new set and our check for \$3
to pay you for your
trouble

An Unconditional Guarantee

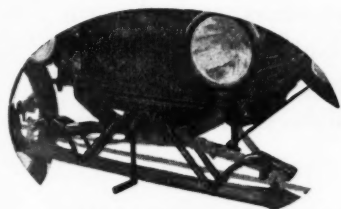
**That Protects Both Dealer and Car Owner
That Makes Selling Easy and Buying Safe**

It takes a lot of confidence in one's product to make a guarantee of this kind. But when you positively know that your product is right, clean through, the chances are not nearly so great as they would appear.

We have been selling H & D Shock Absorbers for a good many years—and from the very start, we have given dealers a guarantee selling plan on which we staked our honor—and our money.

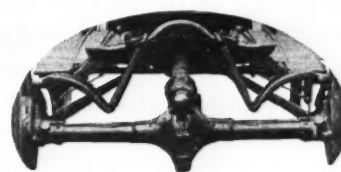
Jobbers: On the same basis that H & D service to jobbers has become nationally known with regard to supplying parts on short notice and in quantity, we are now in a position to serve our jobbers with full page electrotypes showing installations and parts of H & D Shock Absorbers, all ready for insertion in your catalog forms. Reserve page space for your H & D electro. Write or wire us for it, giving size of print page and number of columns. When you get it, it will fit.

Dealers: Order Through Your Jobber



H & D Company
Goodland, Indiana

In Canada: Richard-Wilcox Canadian Co., Ltd., London, Ont.



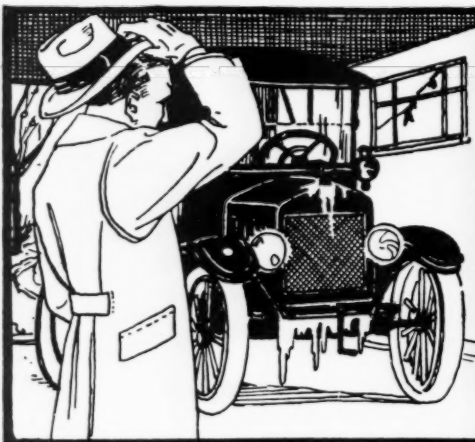
Atlas



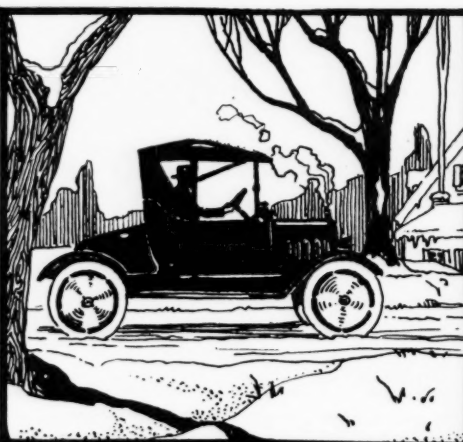
For twelve years **Atlas** has signified the best in water circulating systems. Makers of highest priced cars use Atlas pumps, because their correct design and accurate workmanship can be relied upon to cool the costliest and most delicately attuned motor.

Take Advantage of This Universal Fault of Fords

Here's How YOU Make



Every Morning Joe found
That his Ford was ice-bound



But when out on the road
Great clouds of steam showed



This had Joe up a stump
Till you showed him this pump

Here's a Money-Making Chance for Dealers

Ask any Ford driver if he'd like to escape foot-toasting in summer—and the freezing, boiling, steaming, leaky-radiator troubles of winter driving. The nightly nuisance of radiator draining, or the gallons of anti-freezing solution he buys to be boiled away, soon amount up in time and money to the cost of a regular cooling system that saves all expense and annoyance.

You can install the complete Atlas System on a Ford in fifteen to twenty minutes. Simply take out the two bolts that fasten water outlet to cylinder jacket, slip in pump bracket and gasket; screw up two bolts; fasten water connections and slip on fan belt. Nothing simpler. Entire installation equipment including Copper Asbestos Gasket, fan belt, hose and fasteners, is furnished complete with each Atlas Special Pump.

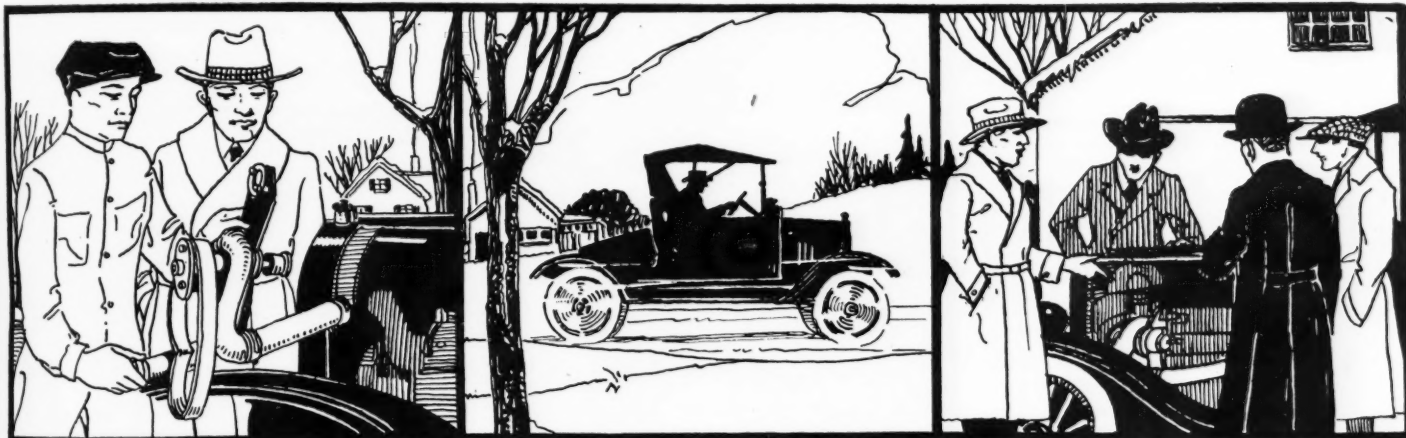
Every Ford that passes your doors represents a sale and neat profit for you.

Centrifugal Water Circulating Pump for Fords

The same cooling principle used so successful on larger cars is applied to the Ford in the Atlas Centrifugal Water Circulating Pump for Fords. It's indetical in design—just as carefully made—simply a Ford edition made smaller in size to meet Ford requirements, and lower in price to sell to Ford owners.

Easy, Profitable Sales

And Do a Good Turn That Brings More Customers



You the Atlas install—
Twenty minutes in all

Now he speeds on his way,
Free from steam all the day

Boosts the wise dealer's sales
For this pump never fails

Investigate This Big Scource of Profit

Get particulars of this money-making Ford accessory. It's a simple device, as easily installed as a fan belt; gives complete satisfaction. Our handsome window hangers, folders, and direct-to-user advertising make it quick and easy for you to sell.

Clip and Mail Coupon Now

While you have the chance before you, send for our proposition. Your name and address on the coupon brings attractive dealer offer. We'll gladly send it, without obligation on your part. Write.

THE ATLAS BRASS FOUNDRY CO.

991 S. Front Street

Columbus, Ohio

The ATLAS BRASS FOUNDRY CO.,
991 S. Front Street,
Columbus, Ohio.

Please send full information and dealer offer on
the Atlas Centrifugal Water-Circulating Pump for
Fords.

Name

Address

The Ford and Chevrolet Tire Carrying Problem Solved

HERE IS THE SEASON'S BEST SELLER

Here is an innovation—a device that takes the tires off the running board and puts them out of the way, behind the car.

The toggle joint makes locking and unlocking the work of but a moment. Your prospective Ford owner customer will open his eyes with surprise when this feature alone is demonstrated. The Emco Tire Carrier saves distorting, chafing and mud covering. It is

quickly installed (only ten minutes being necessary), will outlast the car, conserve convenience and promote appearance.

You dealers can sell all of these models with surprising ease. The prices, \$5.00 to \$6.00, will appeal to those who have long sought relief from the necessity of using makeshift attachments.

Let us send you full information including our discounts.

NOTE: On all Ford cars sold or produced since July 1st, 1919, Provision is made at the factory for attaching tire carriers. Holes will be found already located as outlined above.

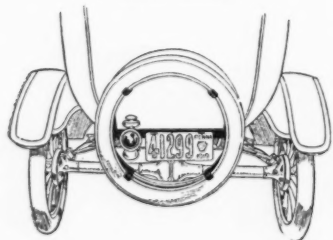
THE EMCO MFG. CO.

44 Court Street

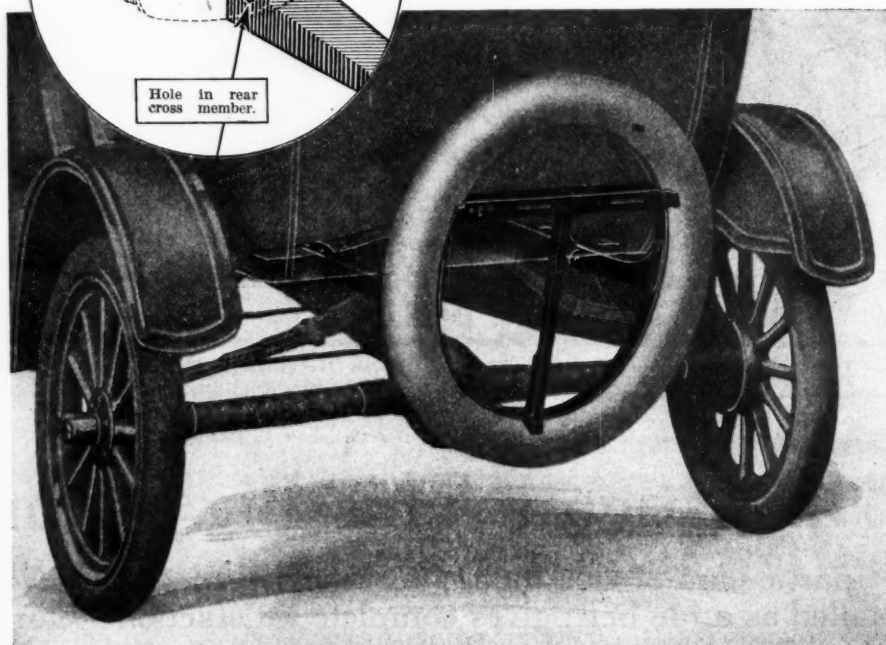
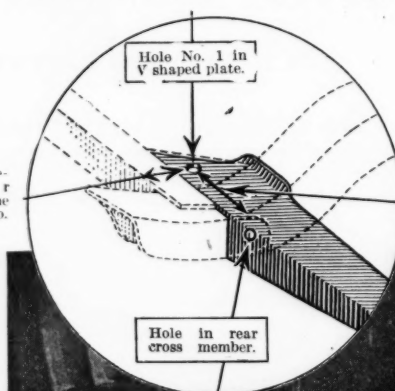
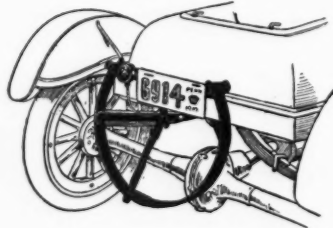
Binghamton, N. Y.

Two inches between outer edge of frame member and No. 1 hole center.

Showing tire in position and carrier locked.



Showing carrier ready to receive tire.



THE
EMCO **TIRE CARRIER**
 IT'S ALL IN THE TOGGLE

Lay Low This Master Thief of Motordom!



Pent up carbon and oil-muck clog the muffler and cause backpressure.

Backpressure is a Raffles—the master thief of motordom.

He rides with his victim. His work is silent and sure.

He steals the power needed on hills.

He is a gasoline spendthrift. Lazy cars and lack of mileage become his boon companions. He fattens on excess oil turned to carbon.

Don't wait for his final warning. The muffler rattle, followed by the muffler blowout, is a bother and expense easily avoided.

The Taber Cutout kills this menace—blows out carbon and oil muck before it reaches the Taber muffler.

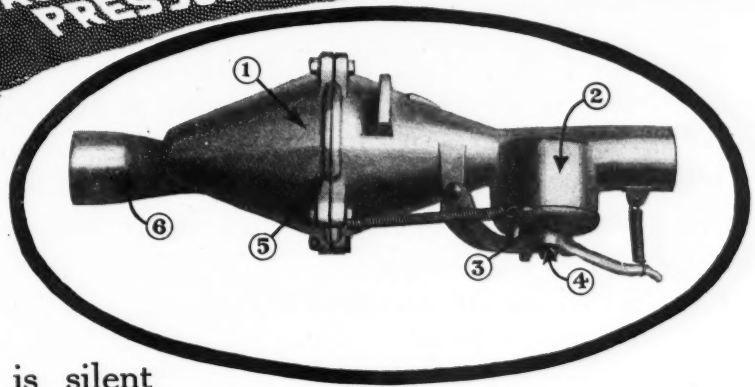
Co-operation between the Taber Muffler and Taber Cutout is **real** because the two are one. Study the six reasons why, opposite.

Full directions with each Taber make installation an easy job.

DEALERS: Our sales letters will interest every prospect in your territory. You should carry the TABER as a stock item. If big profits and quick turnovers interest you, write or wire an initial order. Don't forget to mention the name of your favorite jobber. Act now. Don't be satisfied with later profits.

EMCO Manufacturing Company

Makers of Dependable Products for the Automobile
44 Court Street, Binghamton, N. Y.



Six Points for More Peaceful Motoring

1. The Taber Muffler is a solid casting of sturdy construction. Cannot rattle, loosen or blow out. Nothing to get out of order. No attention, upkeep or expense.
2. Note the businesslike, at-the-front position of the Taber Cutout. It's right where a Cutout should be.
3. Self-cleaning, scissor-like plates of this patented port cutout valve cannot clog. Exit for oil muck and carbon. Road mud cannot get between these plates.
4. Compensating pin balances all wear on only moving part of the Taber. Keeps cutout valve absolutely gas tight.
5. Note tightness and strength of this seam. It makes an air tight and gas tight joint.
6. After the red-hot gases have gone through the Muffler and have been expanded, cooled and silenced, this tail-pipe with its inside straight walls, performs the last rite of slowing them down so that they puff out into the open air in the form of spent gas—utterly lifeless and noiseless.

**Chevrolet, Maxwell, Buick &
Dodge Models \$5.50.
Ford Model \$4.85**
(Higher West of the Rockies)

THE **TABER** BOTH A **MUFFLER & CUTOUT**

From Its First Conception Designed Especially for Fords

The Ford car, with its individually peculiar braking system, requires a transmission lining with exceptional qualities.

VIKING is made only for Fords—from its conception it was designed and built exclusively for Ford service.

The **VIKING** special process of treatment so thoroughly impregnates the fabric that it not only resists heat, water, gasoline, grease and oil—it resists the severe washing-out process to which it is subjected by the hot oil and fuel residue in the transmission case.

Under test, boiling oil failed to wash out the special compound used in **VIKING** Brake Lining.

Viking's special weave gives a maximum braking and wearing surface.

Will the brake lining you are now supplying your Ford customers fulfill such requirements? There is no dark secret why Ford owners and repairmen specify **VIKING**. It is for these reasons alone. **VIKING** means a sure grip, ruggedness, durability.

The next time you order transmission linings for Fords, just say "**VIKING**"—that's the best.

Dealers and Repairmen—Ask your jobber's salesman about **VIKING**. If he can't supply you, write us immediately, sending your jobber's name.

Jobbers—Viking is conducting a sound, energetic national sales campaign, with complete sales helps. Be sure it is listed in your catalog. Write or wire for complete details.

VOGT MFG. CORPORATION
Rochester, N. Y.

Canadian Representative, Canadian General
Electric Co., Toronto, Ont.



VIKING BRAKE LINING *Exclusively for Fords*

PRESTO -FELT

The

Windshield Cleaner You Have Wanted

Once Over Does the Trick in Any Rain or Snow
Scientifically Perfect — "It's in the Felt"

The Cleaner with the Chemical Pads

The Presto-Felt Windshield Cleaner consists of two chemically-treated felt pads—one on each side of the glass—which operate together. One cleans the water from the outside of the windshield while the other keeps the inside of the glass free from dust or moisture. Thus, one operation

One Cleaner
Fits Any Windshield



HOW IT IS ATTACHED:
1 Clamps Over Top of Frame
2 Bolts Through the Frame
3 Bolts Through the Glass

Cleans Both Sides at Same Time, and

Cleans to Stay Clean

As the Windshield becomes thoroughly wet and is then wiped with the Presto-Felt Cleaner, the chemical from the pads causes the rain to "flatten" out as it strikes the glass, leaving a clear, smooth surface through which the driver can get a clear view ahead. No "beads" of rain to obstruct the view—that blindfolded effect is entirely eliminated. And best of all, one cleaning usually lasts throughout any storm. No need to be continually operating the Cleaner. It cleans to stay clean.

Fits Tight—Can't Rattle

Holders are made of high quality, oil tempered spring steel which insure a positive pressure and uniform tension. This prevents cleaner from becoming loose, rattling or dropping down in line of vision.

Look
for this Display
Stand in your
Dealer's Window
or on his Counter.

On Sale at All Dealers. Price \$2.00

If your dealer does not handle Presto-Felt Cleaners, ask him to get it of his jobber. Or, write us direct, giving your dealer's name. Accept no substitutes—no "just as good" article. Insist on getting the genuine Presto-Felt, "The Cleaner with the Chemical Pads."

Presto-Felt Mfg. Co.

71 Presto Building
TOLEDO, OHIO, U. S. A.

The Breath of Winter

In the Air

CONGEALING or frozen oil in the crank case is the cause of many Winter motoring troubles.

Stripped gears
Scored cylinders
Burnt out bearings
Run down batteries

A great many oils freeze solidly at 10 degrees above Zero, as they contain paraffine which thickens in moderately cold weather.

Supreme Auto Oil

**Flows Freely at Zero
Starts With the Engine**

There can be no possible lack of lubrication, even below Zero, as SUPREME AUTO OIL positively contains no paraffine, being manufactured from Southern Asphalt-base Crude. Get it from any dealer displaying the sign of the orange disc.

Write for booklet for further particulars, prices, etc.



GULF REFINING COMPANY

General Sales Offices: Pittsburgh, Pa.

District Sales Offices:

New York

Philadelphia

Boston

Atlanta

New Orleans

Houston

AUBURN Beauty-SIX

THE owner of an AUBURN Beauty-SIX Sedan naturally finds constant gratification in the frequent comment on the beauty of AUBURN design and appointments. But the truest satisfaction in AUBURN ownership is based on the unfailing performance of a chassis perfected over a score of years.

Auburn Model 63-H Touring.....	\$1,695
Auburn Model 6-39-K Tourster.....	1,695
Auburn Model 6-39-R Roadster.....	1,695
Auburn Model 6-39-Sedan, Five Passenger	2,475

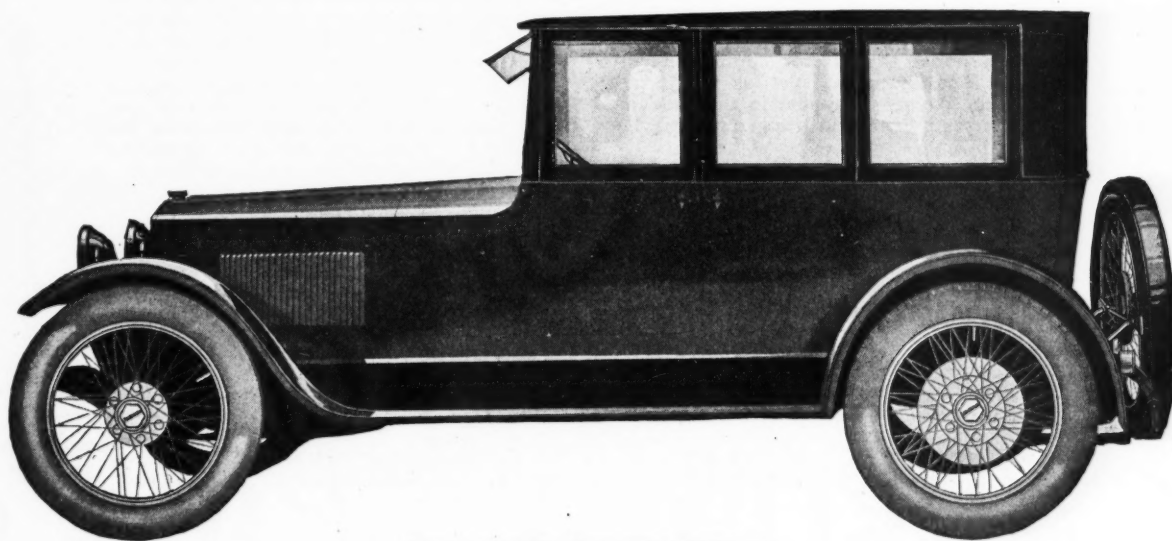
F. O. B. Auburn, Ind.

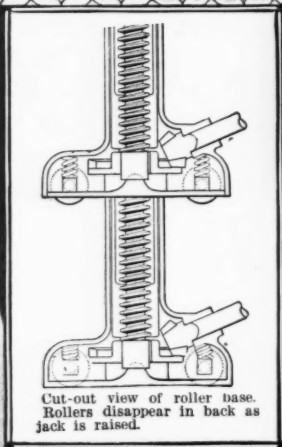
Auburn enclosed models for Fall and Winter are now being exhibited by Auburn representatives

AUBURN AUTOMOBILE COMPANY
AUBURN INDIANA

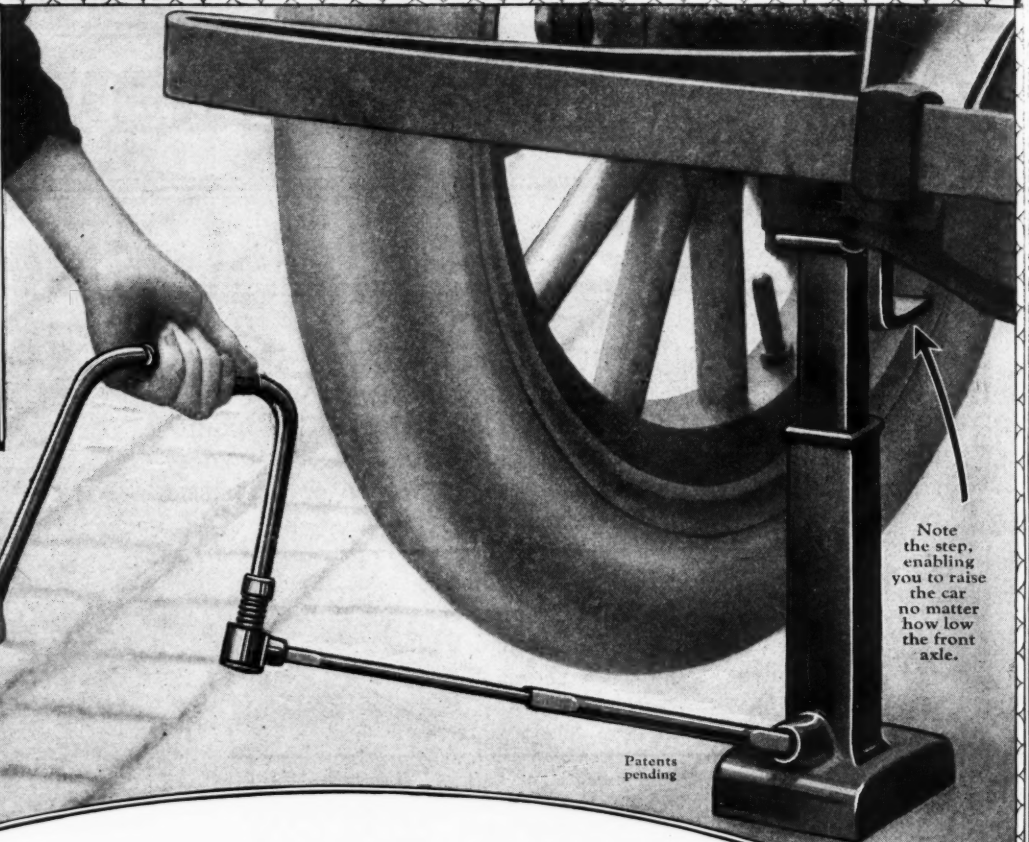
Automobile Engineers for Twenty Years

Vote for Good Roads. Give the Nation a Second Line of Transportation.





Long extension handle means no stooping over or contact with greasy parts.



Motorists Want the Jack that Wheels into Place

Wheel the Arrow Grip Jack in place, and turn the handle. That's all! It's the only Jack that makes every move in lifting the car a simple, easy, clean operation. The roller base—an exclusive Arrow Grip feature—enables you to wheel the Jack under the car without kneeling down or crawling under the car, or coming in contact with greasy parts. Yet, as the Jack is raised, the rollers disappear in the base and the Jack rests firmly on the ground.

The long extension means no bending far

Back by a comprehensive advertising campaign and an unusual sales proposition, the Arrow Grip Jack means increased revenue for you.

Write or Wire Today

ARROW GRIP MANUFACTURING COMPANY, INC.
Department N GLEN FALLS, N. Y.

← ARROW GRIP →
REG. U.S. PAT. OFF.
ROLLER BASE JACK

On Steel Wheels

We will exhibit at the New York Commercial Car Show Jan. 3d to 10th, Eighth Artillery Corps Armory, 193d & Jerome Aves. Take 6th or 9th Ave. Elevated road or Lexington Ave. Subway express direct to building. Spaces 4, 5 & 6.

The object of this announcement, and those to follow, is to tell manufacturers and users of motor trucks about Standard Steel Wheels.

For it is our conviction that the more you know about our product the more clearly you will see the advantages of using Standard Steel Wheels.

Made in our own electric steel foundry,—the only foundry in America devoted exclusively to steel wheel manufacture.—Standard Steel Wheels feature the most advanced ideals in steel wheel construction.

They symbolize all the practical advantages of the steel wheel—dependability, durability, low maintenance cost, low tire cost, and lower assembly cost for the manufacturer.

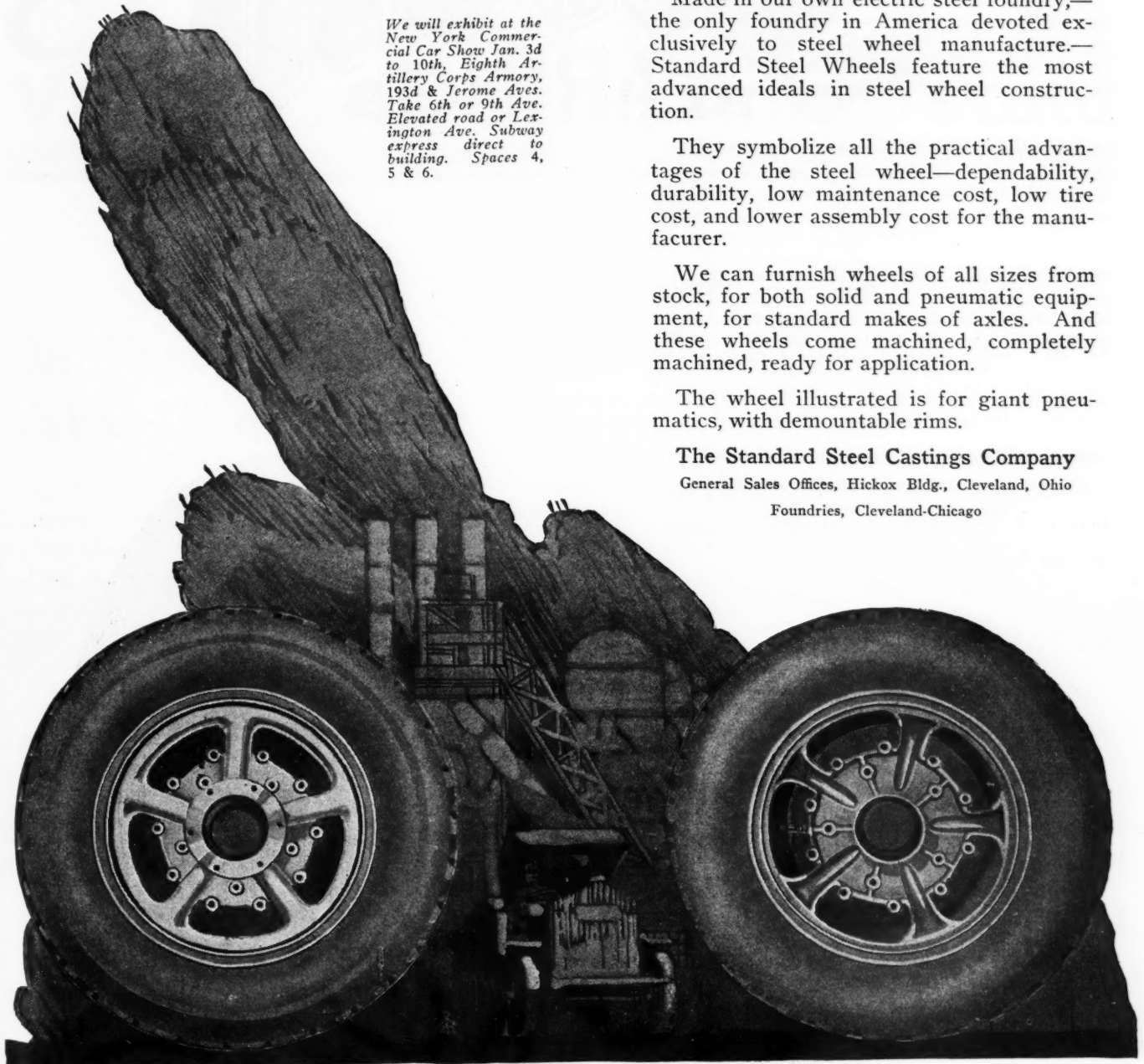
We can furnish wheels of all sizes from stock, for both solid and pneumatic equipment, for standard makes of axles. And these wheels come machined, completely machined, ready for application.

The wheel illustrated is for giant pneumatics, with demountable rims.

The Standard Steel Castings Company

General Sales Offices, Hickox Bldg., Cleveland, Ohio

Foundries, Cleveland-Chicago



STANDARD STEEL WHEELS

Strom

BEARINGS

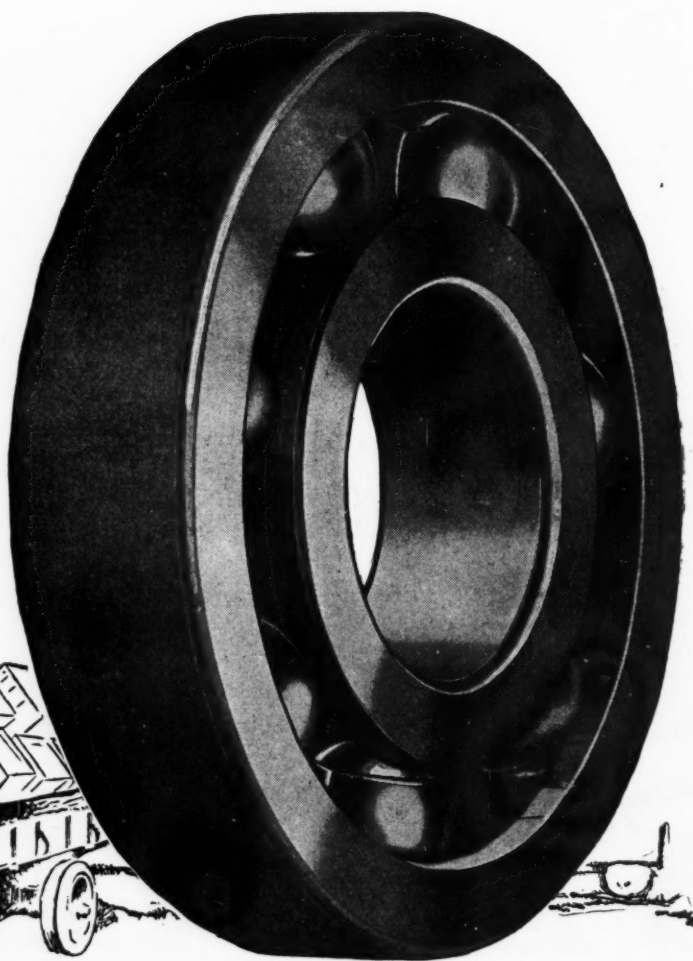
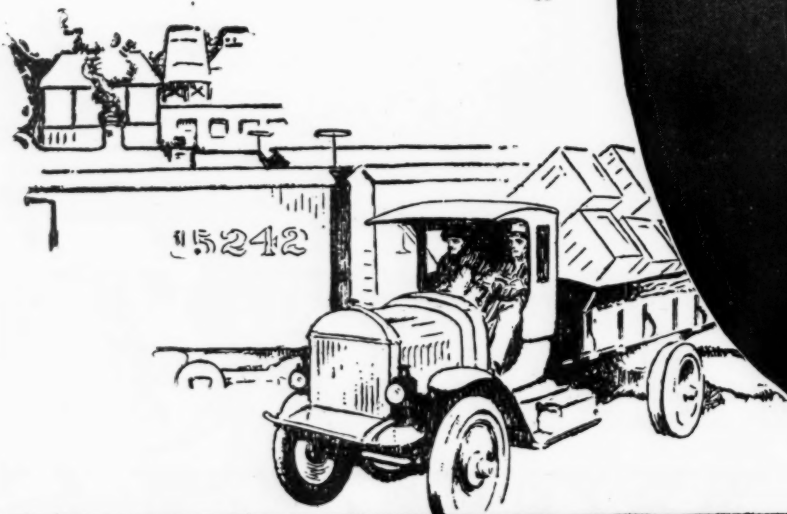
The high standard of quality to which Strom Bearings are built is reflected in the unusually satisfactory service they are giving in many lines of industry. It is only logical, therefore, that the demand for Strom Bearings has increased from the first and that today it is greater than at any time in our history.

U. S. Ball Bearing Mfg. Co.

(Conrad Patent Licensee)

Palmer Street and Kolmar Avenue, Chicago, Illinois

39





CARBORUNDUM

Valve Grinding Compound

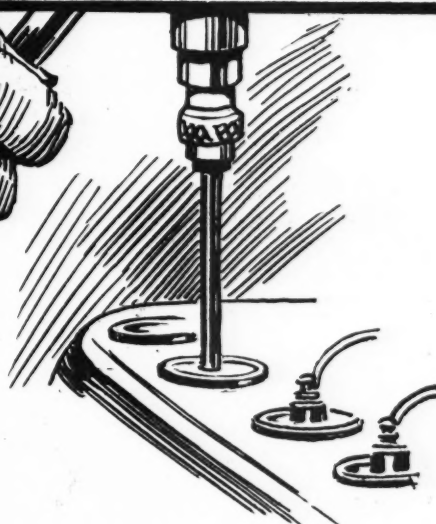
On That Next Valve Grinding Job

You will note the difference at once—Carborundum Compound cuts so clean and fast. There is no drag—it's just sheer uniform cutting and the carbon deposits and pit marks go, leaving the valve seat true, smooth and leak proof.

CARBORUNDUM COMPOUND NEVER SCORES

The Carborundum grains mixed with the high grade grease are absolutely uniform. There is no grooving or gouging. Incidentally, Carborundum has such remarkable cutting powers that much finer grain can be used, insuring a truer, smoother, cleaner seat.

THE CARBORUNDUM COMPANY
Niagara Falls, N. Y.

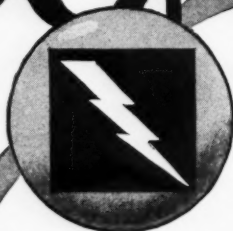


**YOU WILL GRIND YOUR
VALVES QUICKER AND
EASIER WITH CARBO-
RUNDUM.**

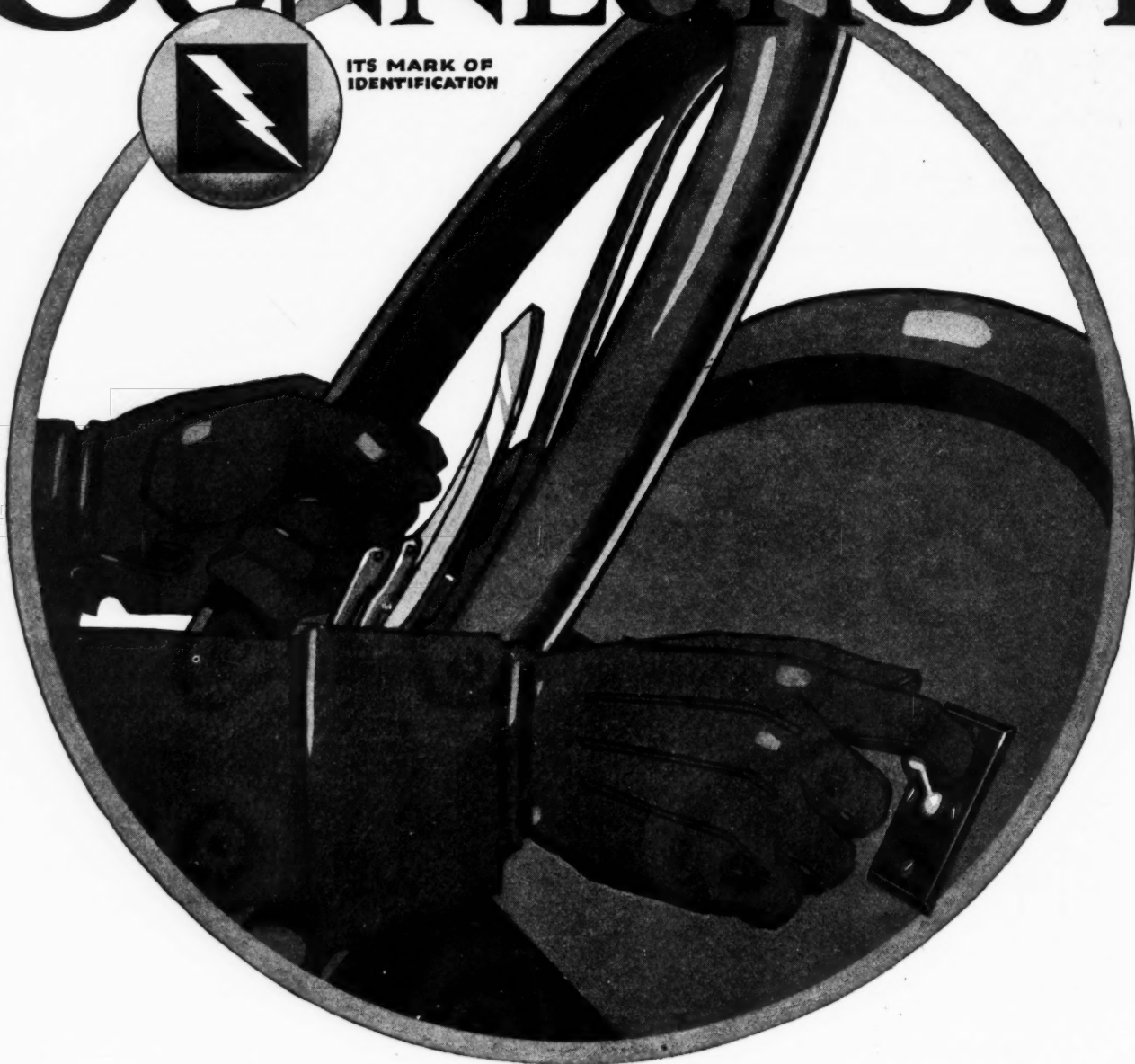
IN HANDY COMBINATION CANS
OR ONE AND FIVE POUND TINS.



CONNECTICUT



ITS MARK OF
IDENTIFICATION



Toggle Switch

The pioneer of a new type of lighting control—neat, simple, sturdy.

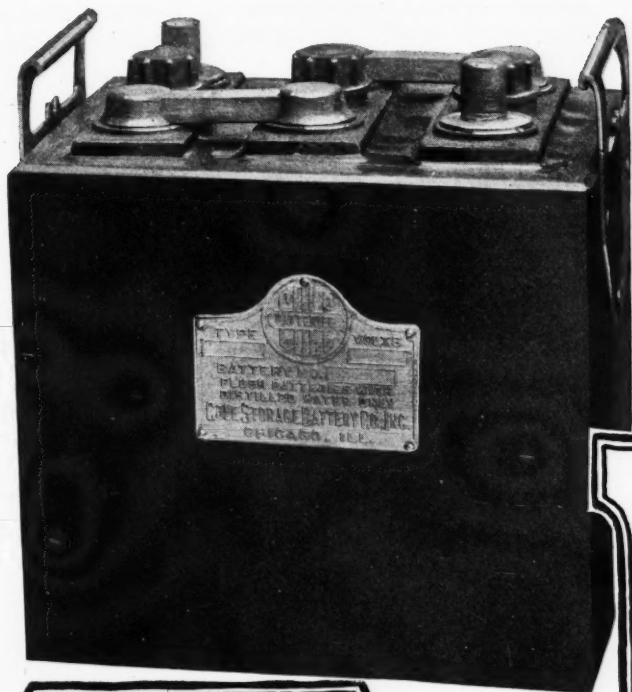
Its self indicating position—to the eye or touch, and the ease and precision with which it snaps lights on or off, make it a more desirable switch in every way than other lighting controls.

No.
75-Y

Finish
Black Enamel

List
\$0.30

CONNECTICUT TELEPHONE & ELECTRIC COMPANY
Meriden Connecticut



What Puts Quality Into A Battery?

When we get right down to facts we find that the general design of all storage batteries is practically the same—different in some details but fundamentally the same. This is *not* what constitutes quality in a storage battery.

But the merits of a battery *are* determined by the materials and workmanship that enter into its construction. We recognized this when we started building batteries. We recognize it today.

Sell Quality and You'll Sell Satisfaction

Make that the big idea back of your battery sales, and your battery business will be a success.

You will find this idea fully expressed in COLE Storage Batteries—built in every detail of the finest materials. COLE workmanship is unsurpassed. It is responsible in a big measure for COLE quality.

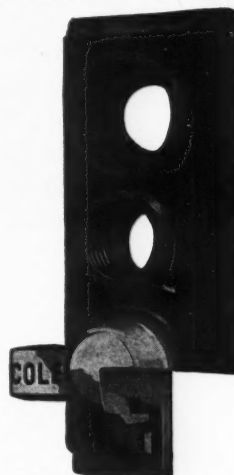
Write to us for complete details of this *quality* battery. Some exceptionally good territory still open for progressive distributors and dealers.

Cole Storage Battery Co.

2435-7-9 Indiana Ave.

Chicago, U. S. A.

A COLE Feature



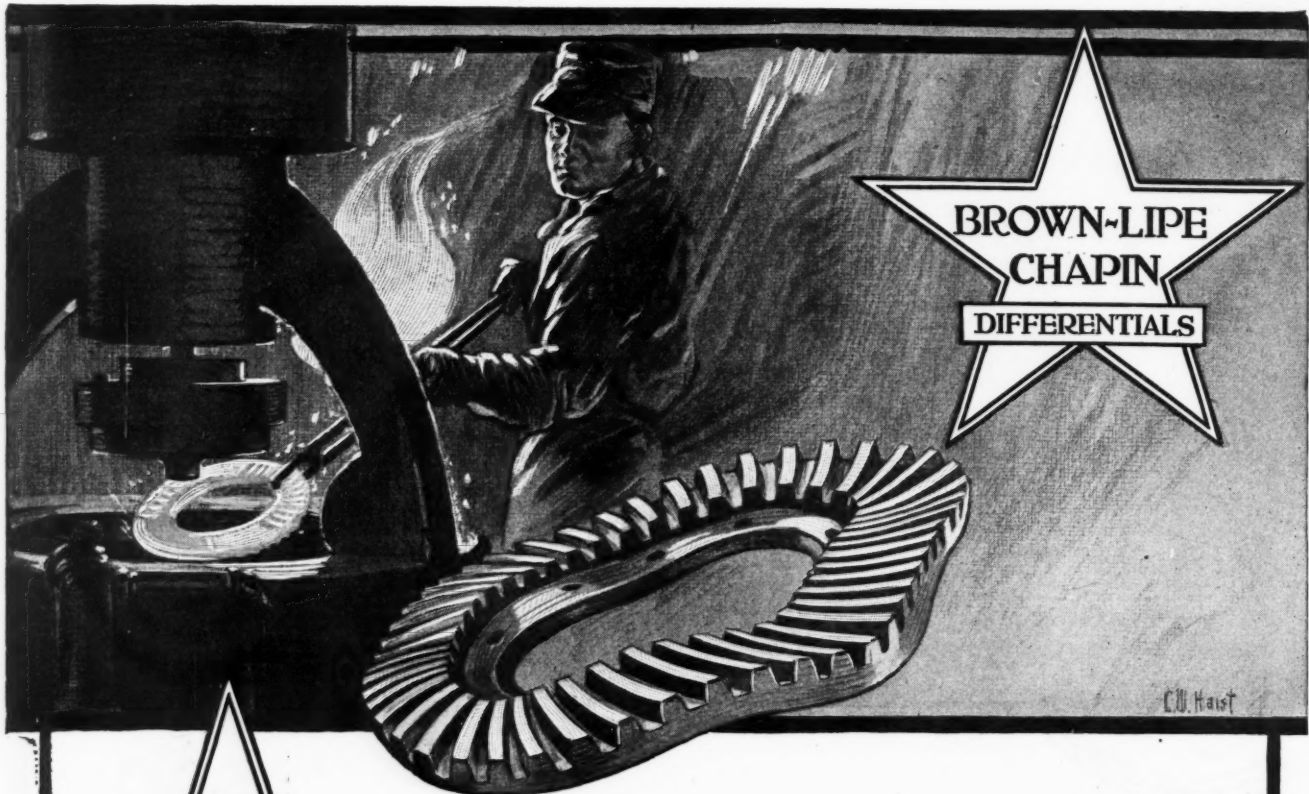
Uniseal Cover

A feature that separates COLE Storage Batteries from the commonplace. The acid cannot leak out and corrode the terminals—a worth while selling point.

COLE BATTERIES

TRADE MARK

Guaranteed
for 18 Months



Exaggerated?— Yes

But a gear that is heated and suddenly quenched **will warp**—unless special pains are taken to prevent it.

Brown-Lipe Gears are quenched in a special machine that holds them **absolutely true** under great pressure.

This directly affects the car- or truck-owner. It increases the dependability of his gears.

BROWN-LIPE-CHAPIN CO.
DIFFERENTIALS

BROWN-LIPE GEAR CO.
TRANSMISSIONS

Both at SYRACUSE, N. Y.

No. 5 of 40 Reasons for Superiority

Why the Brown Is a Better Vulcanizer

BECAUSE of the fact that the *dry cure* process, the principle upon which Brown Vulcanizers work, has been proven most efficient after years of experience, because only the best material is built into them and because they are simply and easily operated, Brown Vulcanizers and Retreaders are today meeting the demands successfully in hundreds of repair shops and garages throughout the country.

The boiler and steam chest of the Brown Dry Cure Retread Mold are cast in one solid piece, the same as the No. 100 and No. 200, making each machine a single unit.

The Rib Tread is machined in the solid casting, and when tire is re-treaded it has every appearance of a new cord tire.

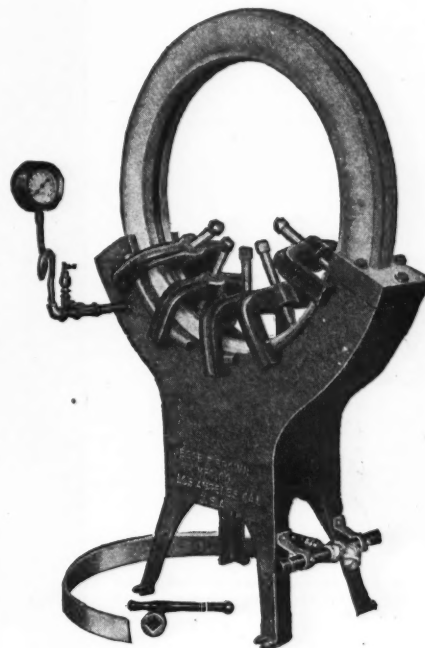
The No. 100 Brown Sectional Vulcanizer is steam jacketed and cast in one piece, having no packed or bolted joints, thus avoiding the possibility of leaks. It is very compact, only occupying a small space.

This vulcanizer will cure perfectly any tire made, from 3 to 5½ inches, including all clincher, quick-detachable and straight-side types.

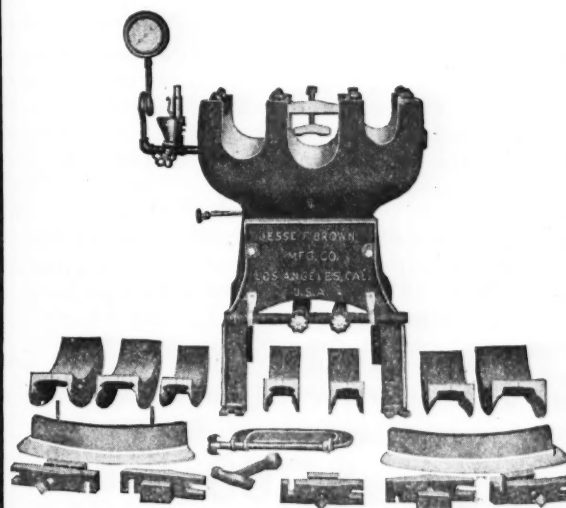
Equipped with steam gauge, safety valve, filler and filler valve and gas burner valve, so that steam can be generated in the vulcanizer.

Manufactured by
JESSE F. BROWN MFG. CO.

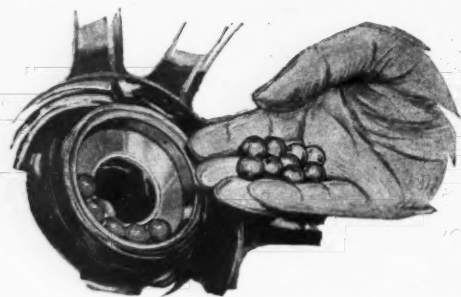
Sales Department:
THE BAILEY-DRAKE CO., Inc.
1120 S. Michigan Ave., Chicago



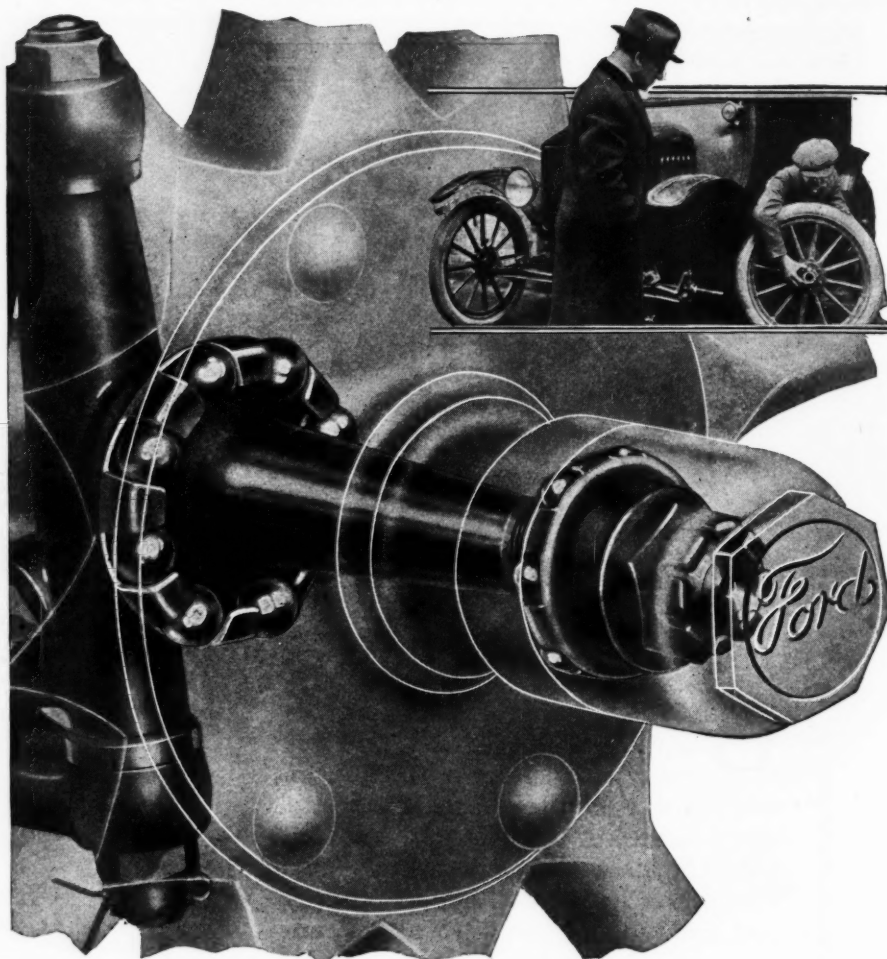
Brown Dry Cure Retread Mold



No. 100—Brown 3-Cavity Sectional Vulcanizer



When the bearings are merely poured into the hub the balls run loose, creating friction and eventually serious trouble.



Good News For Owners of Fords and Chevrolet 490's

No more worn out front spindles, broken balls or wobbly, hard steering front wheels.

When ball bearings are merely poured into the hub the balls run loose in the bearings and create intense friction by "putting the brakes on one another."

Then when the cone or cup becomes worn there is a tendency for the balls to jump the cone and allow the wheel to ride on the spindle, wearing out axle parts and causing the wheels to wobble and steer hard. With Goodrich-National Ball Bearings in the front axle, the balls cannot run loose, climb the cone, stick, lock and break, when the car hits bumps and ruts. The balls are held in their proper place and will run

indefinitely without adjustment.

The Goodrich-National Ball Bearing separates the balls, allowing them to run freely and smoothly without contact with one another. It prevents them from working out of the raceway and eliminates the many troubles that come from this cause. Friction is reduced more than 33% and repair bills for front axle trouble are cut to the minimum. It eliminates worn out spindles, broken balls and wobbly hard steering wheels.

Low Cost—High Mileage

Goodrich-National Ball Bearings cost about one-fifth the price of ordinary ball bearings or roller bearings, yet they are as serviceable and

efficient as the far costlier product and are so guaranteed.

The balls are made of the highest quality steel which insures long life and complete satisfaction. Can be easily and quickly installed by anyone. No changes to make. Goodrich National Bearings merely take the place of the present bearings in the Ford and Chevrolet 490.

Dealers and Repairmen:

Try out a set of these bearings and see for yourself how good they are. If you or your customers are not thoroughly satisfied, the purchase price will be refunded. For sale by good dealers and jobbers everywhere.



\$1.50

for complete set of 4 bearings, ready to install.

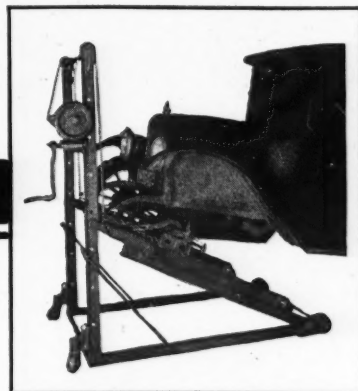
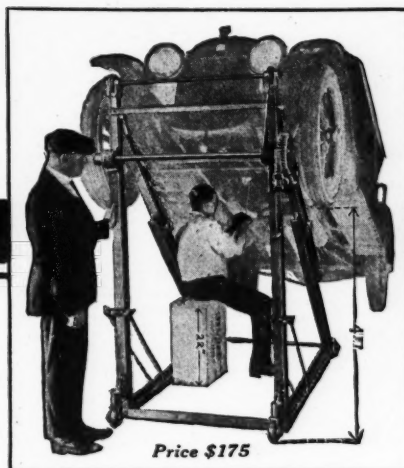
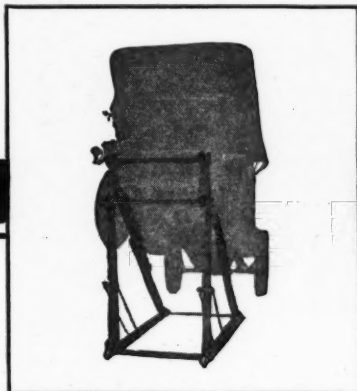
Note the individual housing of each ball in the retaining chamber. Each ball performs alone and needs no adjusting.

GOODRICH-LENHART MFG. CO.
36 Pine St., Hamburg, Pa.

Goodrich National
Ball Bearings for the Ford and Chevrolet 490

KLEMME

ONE MAN AUTO HOIST AND CRANE



Why a Man Can Do More Work Sitting Up Than Lying on His Back

Did you ever stop to figure how much time a mechanic loses when working under a machine—crawling in and out after tools and lying on his back on a greasy garage floor with oil dripping in his face? A *Klemme One-man Auto Hoist and Crane* doubles the efficiency of your mechanic because—

IN the first place he is able to sit up and work under a car with plenty of daylight streaming in on the job. The *Klemme Hoist* will lift either the front or rear end of a car any height to suit the job. He can take his tools all with him—fasten his vise on the upright beam of the hoist, and it isn't necessary for him to come away from the job until it is finished.

The *Klemme Auto Hoist* lifts from underneath the axle, which is the only correct, practical and safe way of lifting a car. There is danger of marring the finish of an automobile — *Klemme Safety Device* eliminates any chance of a car dropping or slipping down—and all the time the work is being done the auto is absolutely rigid.

It is easily moved from one part of the garage to another or even into the street to a job if necessary.

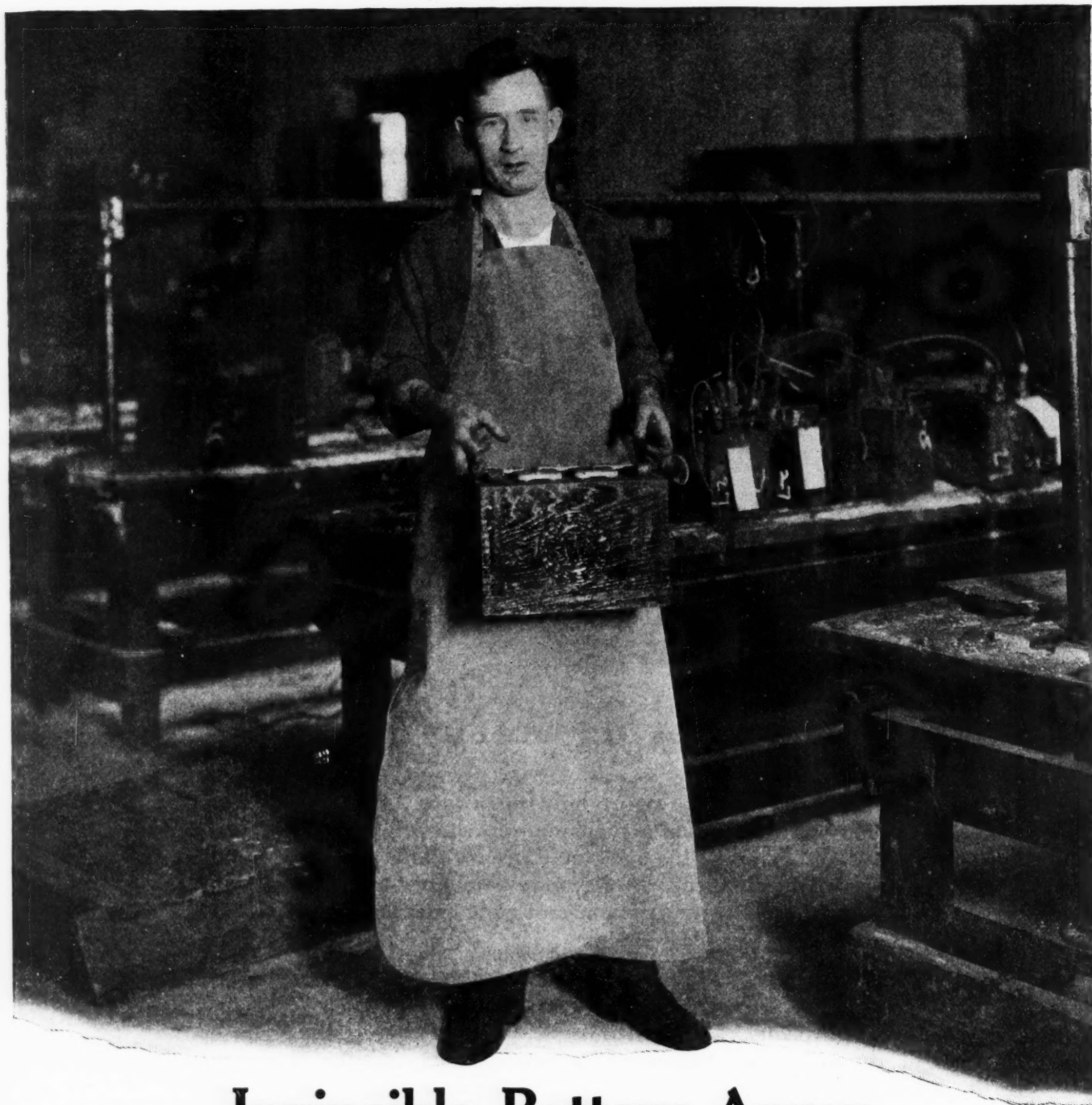
The crane attachment takes the place of an overhead track. Can be used to lift out motors, transmissions, bodies, etc.

Write us today for further information on this time and labor saving *Hoist and Crane*.

KLEMME MANUFACTURING CO., Davenport, Iowa

Sales Department:

THE BAILEY-DRAKE COMPANY, Inc.
1120 S. Michigan Ave., Chicago, Ill.



Invincible Battery Apron

Here Is An Apron That Is Really Acid-proof

After months of exhaustive tests the *Invincible Battery Apron* is put on the market to supply the demand for an apron that will stand up under the hard usage in battery stations.

Made of the best grade of strongest rubber fabric—manufactured by a secret process, you get a pliable, long-wearing apron—actually proof against acid.

The INVINCIBLE APRON is made up in two sizes—the large—46 x 30—the small—40 x 23. Heavily stitched binding prevents any possibility of the edges becoming frayed or worn. Aprons made with cemented edges soon loosen with the action of acid.

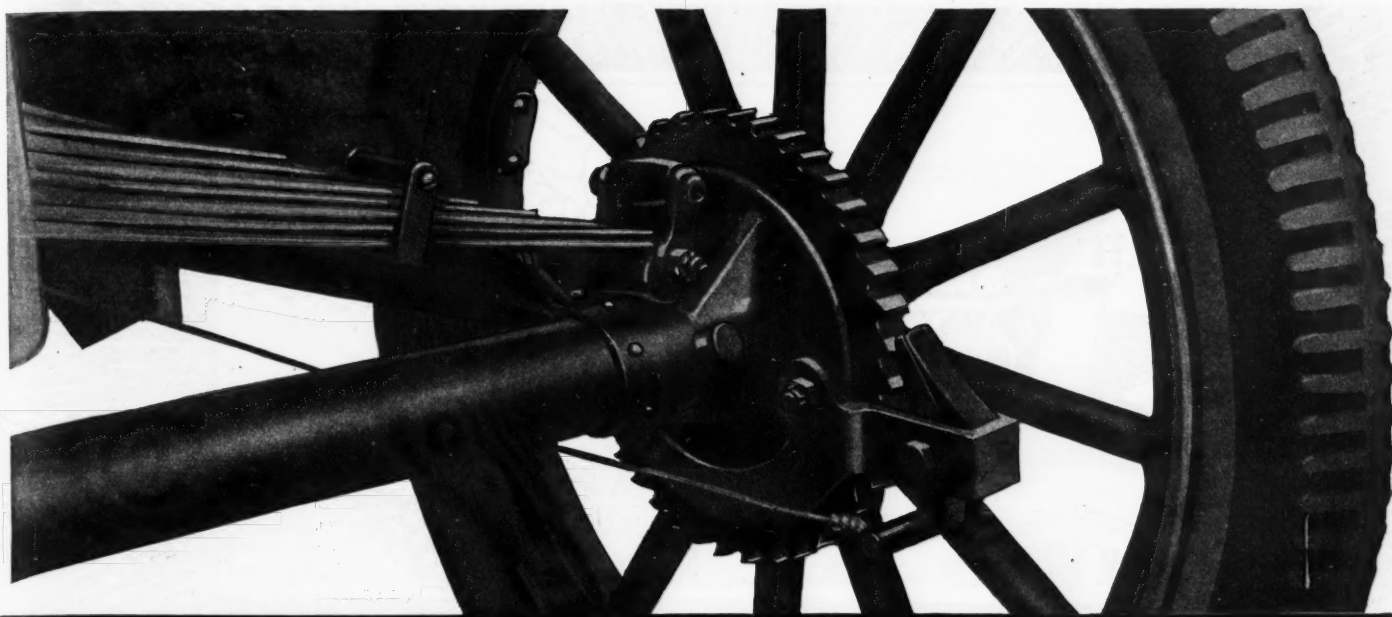
Send today for a sample of this apron—also further information and prices.

Manufactured by DEFIANCE WELDING COMPANY

Sales Department:

THE BAILEY-DRAKE COMPANY, Inc.

1120 S. Michigan Ave., Chicago, Ill.



It's the **AUTO-STOP** *for FORDS*

PATENT ALLOWED
"You're Safe in its Grip"

On Inclines Grades and Hills

In danger and distress, fear and terror may banish quick thought and quick action. When you are just seconds too late, your loss without an Auto-Stop may be beyond computation. Don't place too much dependence upon brakes. They may fail you at the crucial moment when your engine stalls on a steep hill. The car may back into a ditch, or, if in traffic, smash into someone's headlights—or, worse, go over a precipice into a ravine.

You can't slip back when equipped with an Auto-Stop. You can forget about keeping your foot on the brake. It saves wear and tear on tires now caused by parking against curbing. It prevents possible accident and damage suits when mischievous children climb into the car.

Brakes left set for any length of time, create a strain and require frequent adjustment. The Auto-Stop is not a brake. Its parts are not subject to any wearing strain. Use it as often as you like. It saves wear and tear on the brake system.

The Auto-Stop attaches to a rear wheel of the Ford. Its ratchet wheel is mounted upon a new brake drum supplied with the set. The bracket arm bolts on the brake-drum housing.

It is operated in front by the driver's foot upon a pedal, like a cutout. It is easily and quickly installed by the car owner. It is simple, convenient and positive in action. Never wears out; needs no adjustment.

Put the Auto-Stop on your Ford. Use it for thirty days. If not entirely satisfied, simply return it. Our distributors are authorized to refund purchase price.

Wayland Products for Fords are practical, efficient devices. They make an instant appeal to Ford owners. Quick turnovers are assured dealers who stock them. Ask your jobber's salesman about Wayland products, or write us direct, giving your jobber's name. A few exclusive territories open for high-grade representatives, calling on jobbers and dealers.

Wayland Specialty Mfg. Co., INC., WAYLAND, N.Y.
Makers of the Auto-Stop, Finch Extension Door Latch, Wilkins Low Gear Control and other FORD accessories



**Here is What You
Need to Render Better
Service and Make
More Money,
Mr. Mechanic—**

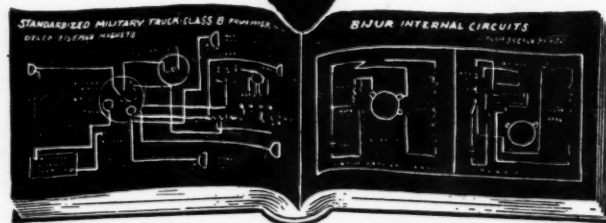
**The 1919 Edition
of the Automotive Wiring Manual**

is a collection of 750 blue print working plans of all cars from 1912 to date. It is worth more than any tool that the busy garageman has, for it shows at a glance just where to look for trouble and will enable him to do ten times as much work in a day.

Each drawing was made especially for the Manual and from manufacturers' original shop blue prints, or other authorized data, and are not merely photographic reproductions from catalogues, trade papers, etc. There are no "junk" drawings, no unnecessary reading matter to fill space, and take up your time when it is most valuable. Just a complete set of official wiring diagrams covering all the cars now on the road in original blue print form, and bound in so you cannot lose them.

The 1919 edition contains 680 pages of diagrams and text, covering official circuit diagrams for nearly 600 different models of cars, 175 official internal wiring diagrams of generators, starters, coils, etc., with 20 pages of instructions on care, repair and construction of all electrical parts.

Every diagram is a full size blue-print as large as this page showing all details. No



**Contains 750-Official
Blue Prints of Standard
Car Manufacturers**

mechanic, garage or service station can afford to be without this great time and labor saver. Send for your copy today. Money back if it is not satisfactory.

The AUTOMOTIVE WIRING MANUAL shows you

1. In full detail, more about electric starting and lighting systems than any other book of wiring diagrams ever offered the automobile trade.
2. Diagrams in blueprint form—7½x11 inches—a size large enough to plainly show every detail. Diagrams of smaller size and not blueprints are not nearly so legible and become soiled easily through handling.
3. The exact location of all units just as installed. All circuit diagrams in non-technical form, therefore easy to trace and understand.
4. How to instantly understand any and all circuits without spending several hours tracing wires through body and conduits,—as plain as a floor plan of a building.
5. Internal connections of all motors, generators, etc., of all systems used on all cars and trucks. Makes you independent of factory service stations.
6. How to test and repair all units quickly.
7. How to disassemble repair and assemble any storage battery. No other text book on storage batteries necessary—the Manual gives you complete instructions, thus saving \$3.00 to \$5.00—the usual price of such textbooks.

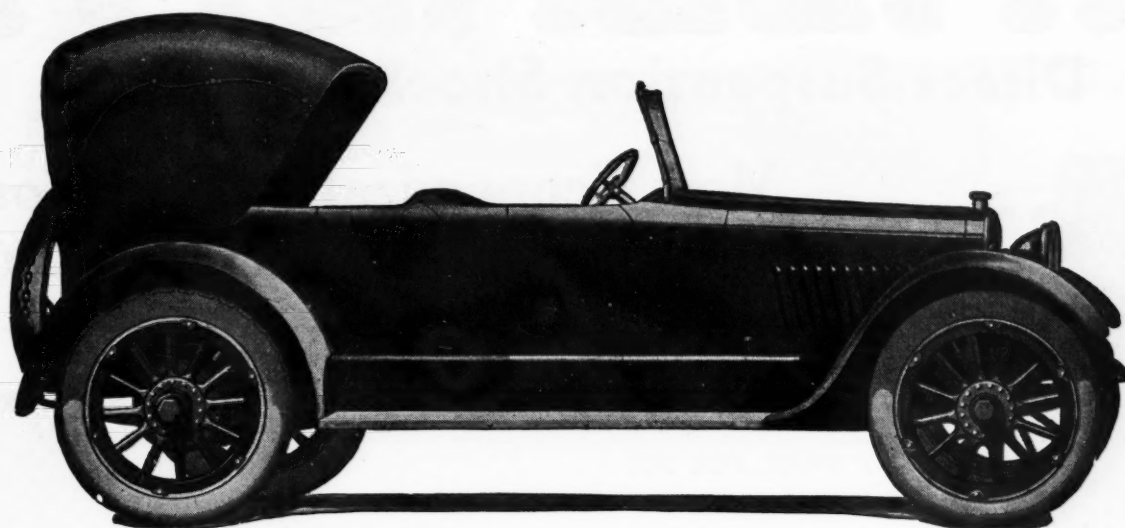
RETURN PRIVILEGE ORDER BLANK

U. P. C. BOOK COMPANY, INC.
243 West 39th Street, New York

Enclosed find \$.....to cover cost of.....
copies of the 1919 edition of the Official AUTOMOTIVE
WIRING MANUAL at \$12.50 per copy, with the under-
standing that money will be refunded if I am not satisfied
with the purchase after five days' inspection.

Name

Address



“Can You Make Immediate Delivery?”

That has been the constant inquiry from dealers during the entire year.

During the last six weeks monitor factory facilities have been increased approximately 400%, permitting *immediate* and *continued deliveries* to a few additional well established distributors.

May we mail to you a catalog describing “The Car Of Service unexcelled.”

Red Seal Continental (6 cyl.) Motor
Borg & Beck Clutch
Grant-Lees Transmission
Perfection Spring

Stan-Par Axle
Bock Roller Bearings
Dyneto Generator-Starter
Stromberg Carburetor

Standard Models \$1575

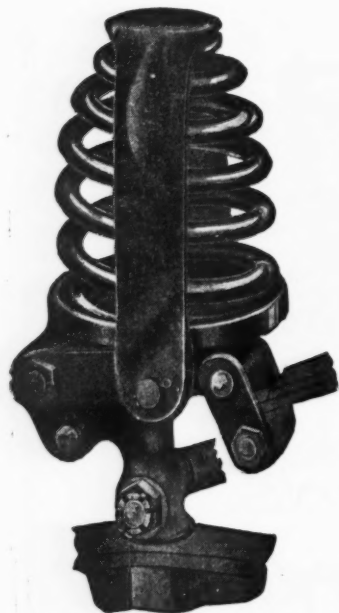
Special Models

THE MONITOR MOTOR CAR COMPANY

Fifth Avenue and Big Four Railroad Columbus, Ohio

HALLADAY

Direct Suspension Shock Absorber



**Most Economical in First Cost.
Most Economical in Operation.**

The Halladay not only saves money in tires, gasoline and repair bills, but is also the lowest priced of all the **real** shock absorbers.

The Halladay is the only shock absorber that has ever had the **capacity** to take the jolts and jars out of the light little Ford.

PRICE PER SET

\$15.00

Find out why.


Write us today.

L. P. HALLADAY COMPANY

Manufacturers of Bumpers, Shock Absorbers, and Automobile Accessories.

520-530 Monroe Street

Streator, Illinois.



TRADE

DRIDEK

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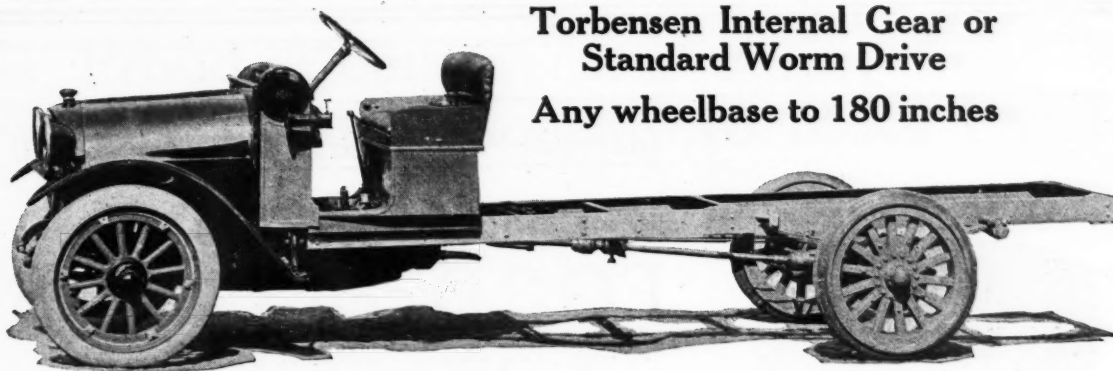
The Most Remarkable
Automobile Top Material

LIGHT IN WEIGHT—DEPEND-
ABLE IN QUALITY — NON-
CRANKING — NON-BLISTERING
—Dridek is Made to Satisfy.

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L. J. MUTTY COMPANY

BOSTON, MASS.



**Torbensen Internal Gear or
Standard Worm Drive**
Any wheelbase to 180 inches

156 inch wheelbase—10 foot loading space
(2 feet of E. & W. frame was cut off this job)



REO DEALERS—ATTENTION

Reo Speed Wagons can be made into 2 and 3 ton trucks with E & W Truck Units. E & W Truck Units are furnished with choice of Torbensen Internal Gear or Standard Worm Drive Axles and any size solid or pneumatic cord truck tires, furnishing a heavy duty truck for any purpose.

Airplane view is of E & W 2-ton Reo Truck—Two short propeller shafts with three universal joints and center hanger eliminate all propeller shaft trouble.

E & W Truck Units will make a truck of any car.

The E & W Full Frame Truck Unit for Dodge Brothers and other chassis widens the field and increases the profits for dealers. Our selling plan means generous profits for you. Write for complete details.

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MILWAUKEE

E & W TRUCK UNITS

Make a Truck of Any Car



Complete with Rings
and Pin

Increase Your Mileage 25% for \$2.50

Cochran FORD PISTONS

SAVES REBORING
A size for every CYLINDER

Furnished in Standard Size

Also the following Oversize

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Light Weight Step-Cut Rings,
Oil Groove

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Garages and Repair Shops
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Please ship by Parcel Post prepaid,
1 complete set of COCHRAN PISTONS

Size.....Price \$7.50

Name

Address

DYKE'S AUTOMOBILE AND GASOLINE ENGINE ENCYCLOPEDIA

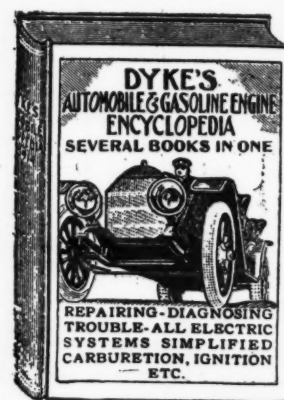
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The new Ninth Edition revised and enlarged in 1919 is a complete treatise on Electric Ignition and Electric Starters and Generators—Adjustments, Tests, etc., of leading Electric Systems—Repairing and Adjusting—Carburetion—Ignition Valve Timing—Engines and Parts—Operation and Care of Car—Digest of Troubles with

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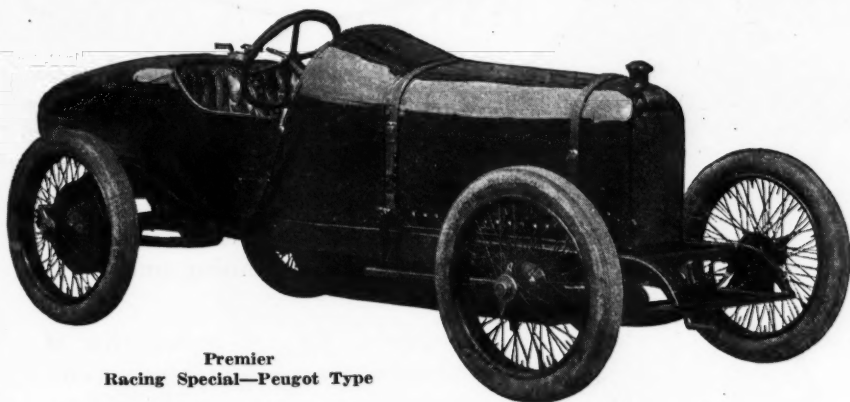
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Racing Special—Peugeot Type

Is offered at an attractive price by the Indianapolis Motor Speedway Company in its sale of world-famous special racing cars of the Peugeot Type. It is in perfect condition—it cost over \$10,000. Here is a royal addition for the motor stable of any sportsman. Note the specifications! For full particulars address

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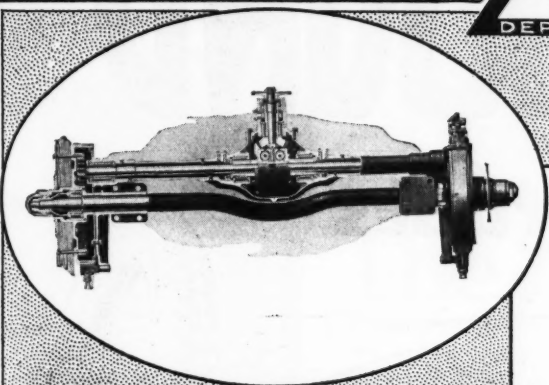
Displacement—278 cu. in.
Cylinders—4 en bloc, 3.648 in. bore, 6.625 in. stroke.
Valves—Top, two admission and two exhaust valves per cylinder.
Camshaft—Overhead, spur drive with idler.
Crankshaft—4 ball bearings (2 rear, 1 center, 1 front).
Transmission—Warner Special—4 speeds forward, and reverse.
Drive—Hotchkiss.
Universal Joints—Spicer.
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Hubs—52 mm. Rudge-Whitworth (Standard Roller Bearing Co.)
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$\frac{3}{4}$ · $1\frac{1}{2}$ · 2 Special & 2½ Ton Models



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LESS UNSPRUNG WEIGHT

Engineers agree that unsprung weight is at least six times as destructive to tires as weight above the springs.

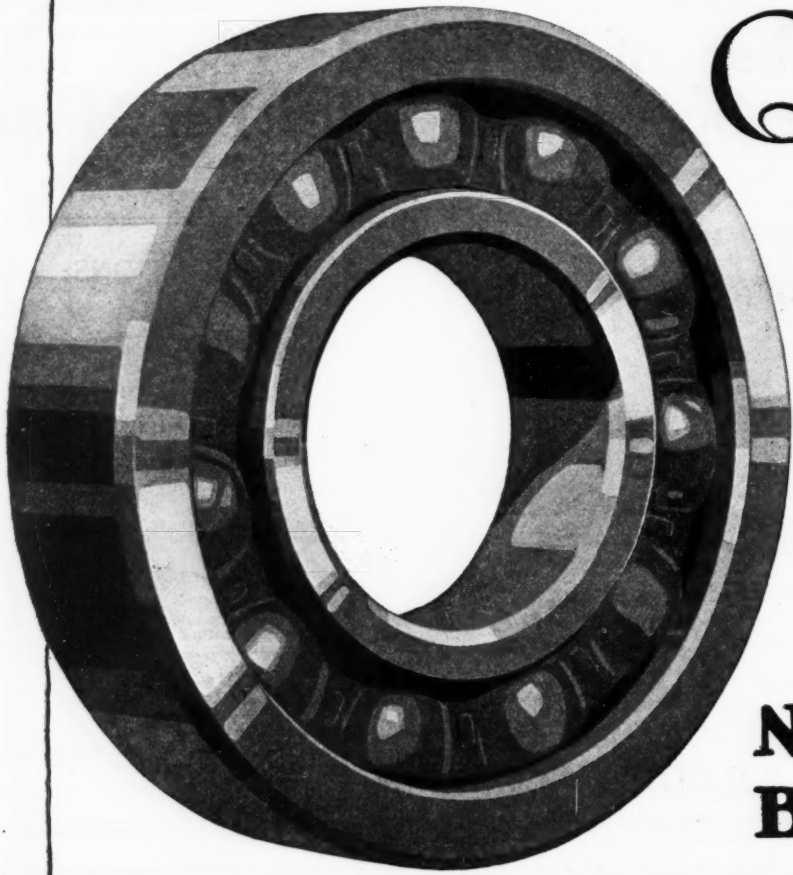
The internal gear driven axles used in TRIANGLE Trucks are much lighter than any other type of shaft driven rear axle of equal strength. The saving in the 2½-ton TRIANGLE rear axle is 400 lbs. This means a saving equal to 2400 lbs. load weight. Stop for a moment, and figure the saving in tires.

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Quality

H EAT generated by bearings is proportional to the amount of internal friction present.

You can judge the efficiency of various types of bearings while in operation by the temperature of the housings—running under the same conditions.

—Another way of saying that if you earnestly consider bearing efficiency, your selection will be New Departure Ball Bearings.

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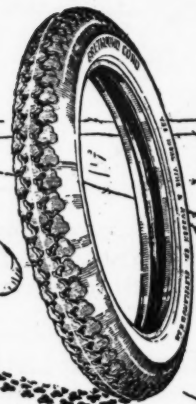
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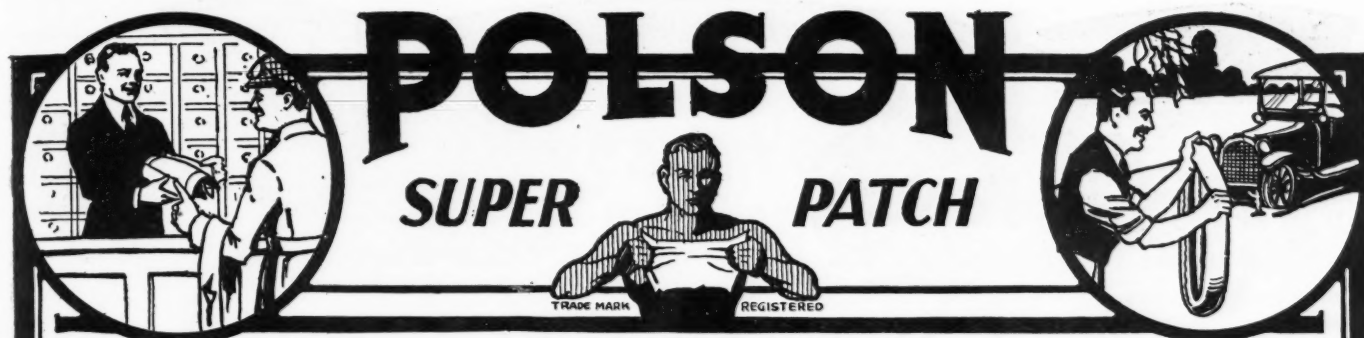


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GENERAL OFFICES & FACTORY
CLEVELAND

*Territory open
for live dealers*

On the trail of a Good Tire





This trade mark on each **POLSON PATCH**

POLSON SUPER PATCHES are to all others as the Cord Tire is to the Fabric Seconds.

They outwear all other Patches.

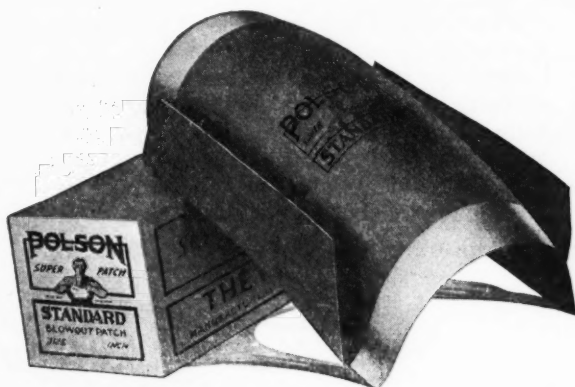
Only new rubber and new long fibre fabric are used in their manufacture.

In extra length—full round width—added number of plies—individually moulded into correct form, **THE POLSON SUPER PATCH** is the most generous, quality plus, patch that can be manufactured.

POLSON SUPER PATCH costs no more than patches made from reclaimed stock, yet they have all the wear giving qualities which only new rubber and new unworn fabric can give.

DEALERS—Send for our 1920 Catalog giving the complete line of **POLSON SUPER PATCHES** and Automobile Tire Accessories, including:

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THE POLSON RUBBER COMPANY

Largest Patch Makers in the World

CLEVELAND, OHIO

It Interested Them It'll Interest YOU

Our announcement of the **FELIX Oil Cup** stirred things up among the trade. We received inquiries from all sections of the country asking for details of our sales proposition. The money-making possibilities of this greatly improved method of lubrication were seen at once.

The Felix Oil Cup

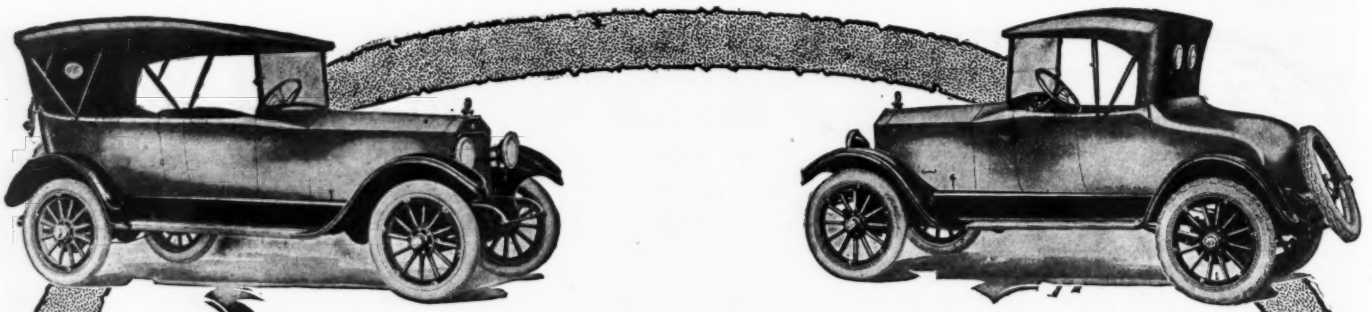
A Combined Pressure and Automatic Feed

The **FELIX Oil Cup** is a combined pressure and automatic feed oiling device. It automatically feeds sufficient oil for lubrication and need not be filled oftener than once a month. When desired, by raising cap and pressing slightly with the hand, the oil is forced over the bearing surface under pressure up to 250 lbs., which instantly flushes out all dirt and grit. The **FELIX** supplies perfect lubrication where grease fails. It eliminates hard riding, squeaks, rattles and waste of oil. It is dust-proof and water-proof. The price is one dollar each.

Write for sales proposition

FELIX MANUFACTURING CO.
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Just lift the cap to fill—no cover to unscrew and fall in the dirt.



A Safe Investment

Men and women of today buy their cars as they buy their bonds.

They want safety, permanence and reasonable returns on their investments.

The car that will make good for the dealer, therefore, is the car that will make good for the owner.

The Dixie Flyer is built to pay large dividends in service and pleasure. It is backed by a permanent company with more than forty years' experience in vehicle manufacturing—a company that will be as willing and able to protect the interests of dealers and owners in the future as it is today.

KENTUCKY WAGON MFG. CO., INCORPORATED, THIRD AND G STREETS, LOUISVILLE, KENTUCKY

The **DIXIE** *Flyer*

The **DIXIE** *Flyer*

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Tools That
Are
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Main Bearing, Babbitting and Boring Tools
"Put New Bearings in Old Ford and Fordson Blocks"

SIMPLE
STURDY
ACCURATE

These tools do a regular factory job.
Perfect alignment;
Proper gear position;
Rebabbitts and bores a set of perfect bearings
in less than twenty minutes.
You need these tools in your shop. Why delay? They
will make you money and friends.
For Sale by Reliable Jobbers Everywhere
ASK FOR BULLETIN B-42

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MINNEAPOLIS MINNESOTA

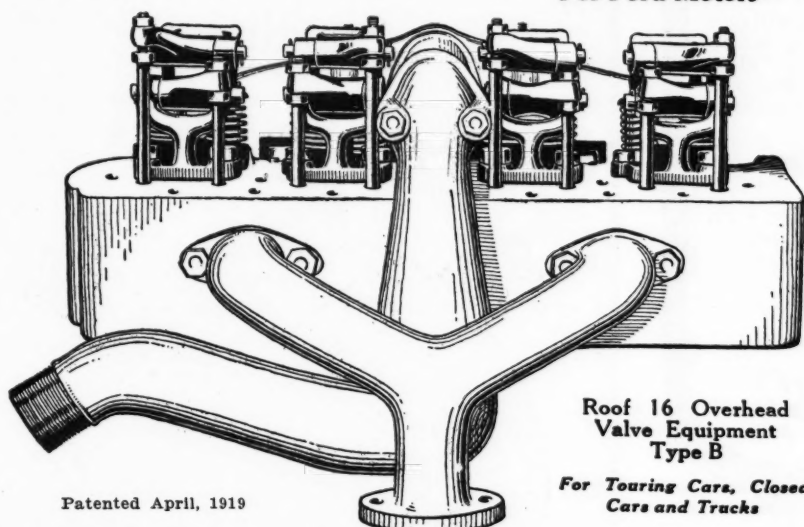


STORM TOOLS ARE STANDARD EQUIPMENT EVERYWHERE

POWER and SPEED

Roof 16 Overhead Valve Equipment

For Ford Motors



Patented April, 1919

Comparison Brake Horse Power Tests at the United States Bureau of Standards gave Standard Ford motor with regulation carburetor 18.7 Horse Power. The same motor with 16 Valve Head and regulation carburetor 22.4 Horse Power. The same motor with 16 Valve Head and Special carburetor 29.7 Horse Power. Recent tests at U. S. Bureau of Standards gave 32 Horse Power. We are Manufacturers and Distributors of speed and other specialties for Ford cars; 3 to 1 gears, high speed camshafts, aluminite, light grey iron pistons, lynite pistons, aluminite connecting-rods, racing spark plugs,

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The Most Remarkable Power Device, Even in This Inventive Age

Hill Climbing for touring cars—pulling power through sand and mud—doubles the hauling capacity of converted Ford truck-speed for mile and half-mile tracks to rival the fastest cars built. Ford racing cars with our Cylinder Head Equipment and special racing parts have attained speeds from 80 to 100 miles per hour. Price, complete, \$115.00 f. o. b. factory, excise tax paid. Nothing extra to buy. Cylinder Head Equipment all ready for installation. It takes the place of the regular Ford Cylinder Head. Any mechanic can easily and quickly install it.

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Anderson, Indiana, U. S. A.



"Over 1,500,000 in use. Nearly every jobber and dealer in the United States stock Rose Tire Pumps and a full line of Repair parts for them."

"That looks good to me. I'll just take it along. How much money?"

"Yes, that's the trouble, but the Rose Tire Pump does not have a brass barrel and will not jam or dent in the tool box."

"Is the Base Cast Iron?"

"It is not. The base is machined from solid screw stock and the stirrup folds alongside the barrel."

"Will the barrel rust?"

"Most assuredly not. The barrel is enameled and baked, it—"

"How about that hose?"

"That hose, my dear sir, is the best I ever saw on any pump, 17-32 outside measurement and 3-16 inside with an inner wall of pure para rubber and 5-ply extra tested fabric."

"Many Rose Tire Pumps sold?"

"Only \$3.00 and you have a pump that will give you satisfactory service for five years. By the way, how much service did you get out of the pump you got with your car?"

"Eh? Service did you say? You can guess. I must go, the folks are waiting. Good-bye."

Manufactured and Guaranteed by

J. H. HANEY & CO.

Hastings, Nebr.

HAYWOOD'S LATEST INVENTION



Here It Is:

A new machine that will earn from \$100.00 to \$150.00 per week in any well established tire repair shop. More than one year of constant experimenting and development work was required to complete it.

Statistics say there will be *One Billion Dollars* worth of tires worn out this year.

Two actual photographs of One Tire

BEFORE and AFTER

being repaired and re-treaded on a silver-lined mold.



The insistent demand for re-treaded tires that would add 3,000 to 4,000 more miles of wear is growing. A new and better machine than had so far been produced was needed.

HAYWOOD'S
Silver Lined
MOLD

meets the need.
Made of white metal—die cast.

—absolutely free from blemishes and smooth as glass. It is truly a wonderful machine. Old tires re-treaded on this machine closely imitate the runner, cord type, and are smooth, classy, bright. All 4,000 owners of Haywood Tire Repair plants will want this new Haywood invention. Owners of other plants should have one.

**SILVUR
LINED
RE-TREAD
MOLD**

Pays for Itself in a Week

Will earn from \$100.00 to \$150.00 weekly. Are you an auto tire repairman? If you are not, why not enter this profitable business? Tire Repairmen earn \$2,500 to \$4,000 per year. Many are doing better, some up to \$6,000 and \$7,000 per year. If you have a tire repair shop, you need this Haywood Silver-Lined Retread Mold. You should write us at once and get the details. It will pay for itself in a week. Every week thereafter you should make \$100.00 or more extra profit.

FREE BOOK

I have an interesting book to send you that tells about tire repairmen and the Haywood method. It tells about automobile tires—it gives inside facts that you should know about profits. When you write tell me if you have a tire repair shop, or, if you want facts about the tire repair business, address

M. HAYWOOD,
Haywood Tire & Equipment Co.
1228 N. Capitol Ave., Indianapolis, Ind.

Write Me: I will tell you how to start in business as an expert tire repairman and earn \$2,500 to \$4,000 per year. Sounds too good to be true. But it is true, every word of it.

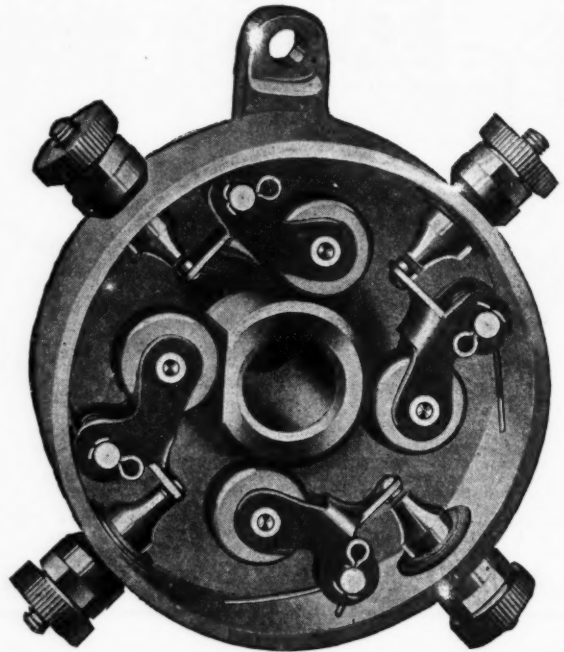
M. HAYWOOD,
Haywood Tire & Equipment Co.
1228 N. Capitol Ave.,
Indianapolis, Ind.

(Mark an X for interest in either or both subjects.)
☐ Send facts about the Silver-Lined Mold.
☐ Send facts about the Tire Repair Business.

Name _____
Address _____

N. E. Gibbard, Charlotte, Mich., owner of a Haywood plant, last year did a business of \$15,000. Charlotte is a town of 7500 population.

Built For Cold Weather Starting



DUNTLEY MAGNETO BREAK TIMER

The positive make and break contact of the Duntley Magneto Break Timer furnishes a strong hot spark to each cylinder. This starts the motor with a spin.

The Duntley is the last word in Timer Manufacture. It has no sliding or whirling contacts to wear out quickly. It requires no lubrication. Equipped with genuine Tungsten Points.

Guaranteed for 50,000 miles—more than 10 times the life of the ordinary timer.

The tremendous sales record it has made is proof of the wonderful efficiency and economy of the Duntley Magneto Break Timer.

J. W. DUNTLEY

1004 Michigan Ave.

Chicago, U. S. A.



WAYNE TYPE "B"

This Test Sells the WAYNE

Just telling your customers that Wayne Pumps are the easiest-acting—simplest—in fact, the best pumps on the market, may not impress them at first. But ask them to take a Wayne out to the car—put it on the tire, have them grasp the man's-size handle and pump. The ease with which the tire goes up—without the "back-aching" labor, will sell the Wayne then and there.

And the Wayne features keep it sold—safeguarding your reputation for quality merchandise—the steel tube handle welded to the piston rod cannot come off—the strong piston rod will never spring—the steel cylinder will not corrode nor easily dent—the cylinder is secured to the base by the shoulder seating method that absolutely prevents leakage at this vital point and its coupling is large enough to grip. The hose is heavy weight, guaranteed for one year.

The Wayne Pump pays you a handsome profit on every sale—so that you can afford to give this product some time and thought. Write your jobber for Wayne Pumps.

We will supply you with detailed information and our sales proposition—write for it to

UTILITIES SALES CORPORATION
Suite 809 Stock Exchange Bldg.
Philadelphia, Pa.
Selling Agents for
WAYNE ENGINEERING CO.
Dept. "17-A"
Designing and Manufacturing Engineers of
Honesdale, Pa.

After October 1st we will begin marketing a pump with the same features and capacity as the Type "B," but only 20 inches long over all—tool-box size—with a 1½ inch barrel.



WILSON'S

*the largest
manufacturers of*

CURLED HAIR

—in the World—

—a position won solely through the high quality of our product.

Wilson's Curled Hair possesses exceptional merit and adds "class," to the finest automobile upholstery. It is the tangible, convincing argument which puts that "almost sale" over the top.

The restful comfort characteristic of fine automobile upholstery stuffed with Wilson's Curled Hair is a live advertisement for your car. Owners get enthusiastic over the luxuriously soft and yielding cushions and backs in their cars.


We produce our own raw materials at a well equipped plant and can therefore give first-hand attention to customers needs. This also enables us to handle all orders and shipments without loss of time.

Try Our Woven Curled Hair Pads Cut to Dimensions

for automobile cushions. They are made by an exclusive patented process which firmly weaves the sterilized curled hair into burlap, forming a perfect shock-absorbing cushion which will not shift, mat down or get bunchy. Send blue prints of seats and backs and receive prices and samples.

Build for the future. Use Wilson's Curled Hair. It will pay you in the increased prestige of your cars.

Send for our booklet—"Comfort in Upholstery." Address Dept. MA 11.

This mark  your guarantee
WILSON & CO.
CHICAGO

Even in This Garage the Radiator Can't Freeze!

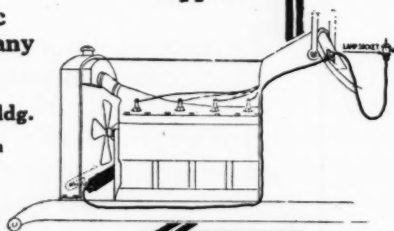
No matter how cold the night may be, the Sharpe Electric Radiator Heater is positive prevention against a frozen radiator. And this heater keeps the entire motor warm for an instant start in the morning. It eliminates priming, warming up, wear on batteries and waste of gasoline. In short, it does away with all cold weather starting troubles. It is the invention of one of America's foremost electrical engineers. It is attached permanently and applies heat to the bottom of the radiator, where it should be. Makes expensive garage heaters unnecessary. For all cars, trucks, tractors and taxi-cabs. Installed in a few minutes by anyone. Attaches to any convenient electric light socket. Distributors and dealers now being appointed. Write for details.

**Sharpe Electric
Appliance Company**

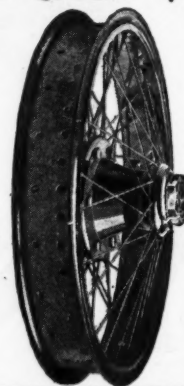
Sales Department
1519 Dime Bank Bldg.
Detroit, Michigan

Sharpe
REG. TRADE MARK
**ELECTRIC
RADIATOR HEATER**

Price
\$11.00



WIRE WHEELS



HOOK
EASY CHANGE

HOUSE
EASY CHANGE

We can supply immediately, sets of Hook Wire Wheels for all the cars listed and any of the service stations below will gladly install them.

Dealers should send at once for the particulars of our service and sales agency proposition.

Buick	Dart	Lexington	Scripps-Booth
Cadillac	Essex	Marmon	Studebaker
Chalmers	Franklin	Maxwell	Stutz
Chandler	Haynes	Nash	Velie
Chevrolet	Hudson	Oldsmobile	Westcott
Cole	Hupp	Overland	Winton
Dodge	Kissel	Paige	

Set of 5 House Wire Wheels, 4 inner hubs, 4 hub caps, hub cap wrench, spoke nipple wrench, one hub dust cover for spare wheel. White, Black, Red; color optional. For Fords, \$65.

For Chevrolet 490 and Overland Model 4, \$75.

WIRE WHEEL CORPORATION OF AMERICA
(Successors to Houk Manufacturing Co.)

1700 Elmwood Avenue Buffalo, New York

Direct Factory Branches and Service Stations:

New York, 835 11th Avenue at 57th Street	Detroit, 16 Davenport Street
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Exclusive Canadian Representatives: Dunlop Tire & Rubber Goods Co., Toronto

TRIPLEXD

The Guaranteed Hose

"This Triplexd Hose is Guaranteed to last a Full Year?"

YOU are guaranteed at least one year's service* from every length of TRIPLEXD you buy. With no other gasoline hose at any price are you sure of this. When you specify TRIPLEXD—we see you get the service you pay for.

METAL HOSE & TUBING CO.
INCORPORATED
235 Tillary St.
BROOKLYN, N. Y.

The Triple X construction makes possible the TRIPLEXD guarantee. Three plies—metal, fabric and rubber—bound into one.

*The average service life of TRIPLEXD Hose is over two years.



GILL



The Perfect One-Piece Piston Ring

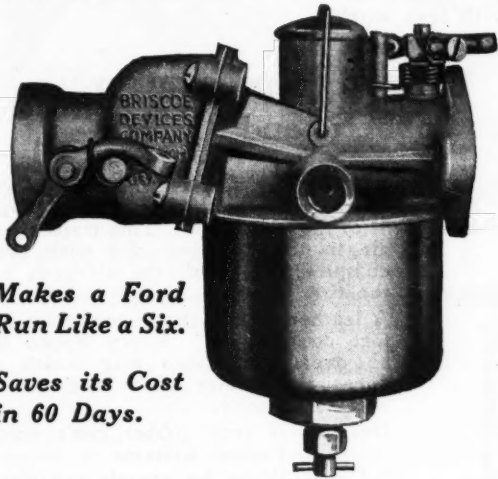
See the interlocking double step joint which allows an expansion of from 1-8 inch to 3-16 inch before any loss of compression occurs. The Gill Piston Ring is listed in the catalogs of hundreds of leading jobbers.

Dealers! Order from your jobber.
Jobbers! Write for full details.

THE GILL MFG. CO., 351 W. 59th St., Chicago, Ill.

SCOPE

CARBURETOR



**Makes a Ford
Run Like a Six.**

**Saves its Cost
in 60 Days.**

Any dealer who puts a Scoe Carburetor on one Ford, opens for himself a neat and profitable line of business.

Simply because this carburetor enables the Ford engine to perform as nothing else can or will.

It gives perfectly smooth running at 5 to 6 miles an hour—without bucking or missing. It picks up from that speed like a shot—again without bucking or missing. It gives speed and power the Ford owner never enjoyed before. All this because it is an absolutely automatic mixing device.

At the same time, it increases gasoline economy 30 to 60 per cent. A Scoe user can easily get 30 miles per gallon. Even with a poor adjustment, he can't help getting 20.

We stand ready to prove these facts, and we want to prove them.

Sign and send the coupon, and we send you the Scoe on our 30 Day Trial Plan. Pay half the net on receipt of the carburetor. Put it on a customer's machine and check up its performance for 30 days.

Then pay the balance, or ask a refund and we will make it without a question.

That surely is a fair offer, and hundreds of dealers have proved it so.

Send the coupon today and start the Scoe business in your own territory.

Briscoe Devices Co.
Pontiac, Mich.

Address

Name

Send trial carburetor for.....
car at dealer's price.

I will pay \$4.25 C. O. D.—balance in 30 days if satisfactory. If not satisfactory, I will return, and you will refund \$4.25.

NAME	POSITION	SALARY.
John	AUTOMOBILE ENGINEER	\$125 A WEEK
	REPAIR MAN	\$50 A WEEK
	CHAUFFEUR	\$30 A WEEK

Put Your Name On This Pay-Roll

Men like you are wanted for big-pay positions in the fascinating field of automobile engineering. We have made it easy for you to fit yourself for one of these positions. You don't have to serve an apprenticeship. Fifteen automobile engineers and specialists have compiled a spare time reading course that will equip you to be an automobile expert without taking any time from your present work.

AUTO BOOKS

6 Volumes Shipped Free

Now ready for you—an up-to-the-minute six-volume library on Automobile Engineering, covering the construction, care and repair of pleasure cars, motor trucks and motorcycles. Brimming over with advanced information on Lighting Systems, Garage Design and Equipment, Welding and other repair methods. Contains everything that a mechanic or an engineer or a motorcyclist or the owner or prospective owner of a motor car ought to know. Written in simple language that anybody can understand. Tastefully bound in American Morocco, flexible covers, gold stamped, 2,650 pages and 2,100 illustrations, tables and explanatory diagrams. A library that cost thousands of dollars to compile but that comes to you free for 7 days' examination.

Partial List of Contents

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Prints of Wiring
Diagrams
Explosion Motors
Welding
Motor Construction
and Repair
Carburetors and
Settings
Valves, Cooling
Lubrication
Fly-Wheels
Clutch
Transmission
Final Drive
Steering Frames
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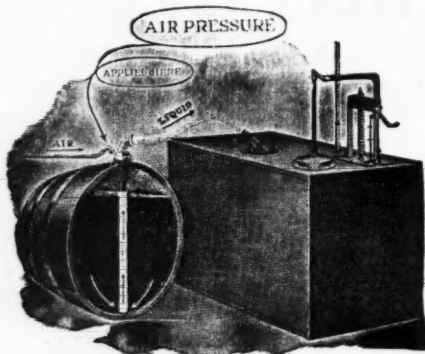
A Real Labor Saver

Empties a Barrel of Oil in 3 Minutes, Without Pumping or Any Work Whatever

Air Pressure Does it All—You just roll the barrel up to the tank and connect the

OPTIMO

Barrel Discharging Bung



It will prove itself worth many times its price—\$10 complete with 24" length of flexible metal conveyor tubing—

GUARANTEED

on a "Money Back" Basis to do all we claim for it

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No Labor, No Waste, No Slopping

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All infringements of patent rights and users of such device will be prosecuted.

FAPCO

FORCE AIR PUMP

Feel the air escaping from an ordinary pump. Then try the Fapco. No air escapes—you pump all the air into the tire with the Fapco in less time with less work.

A Live Proposition for Jobbers and Dealers

The car owner wants it the moment he sees how it works. An intake valve at the top opens and closes with the movement of the piston rod. This traps all the air in the cylinder. So with every complete stroke all the air goes into the tire.

A leather cup in the piston gives perfect compression. Every Fapco has an expansion piston ring which reduces the chance of a leak and increases capacity.

Dealers—If your jobber can't supply you with Fapcos, write us.

Jobbers—Write for sample and terms.

FORCE AIR PUMP CO.
JEFFERSON IOWA



Wisconsin

TIMER

for Ford Cars Trucks and Tractors

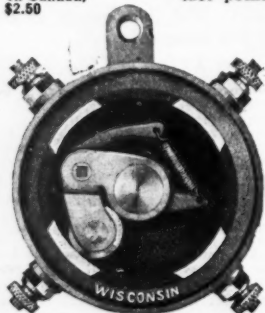
Extreme Care in Manufacture Produces an Instrument of Unusual Accuracy.

The expert hand work on this timer has resulted in a timer that is accurate to the thousandth of a split second. It is like a custom made automobile—the zenith of perfection.

The Shell—Stamped from high grade nickel finished steel.

The Fibre—Made of bone-dry grey fibre that positively will not absorb oil. Pressed in the shell under hydraulic pressure; fits tight so no oil can get behind ring to "short" the timer. Wears even—and smooth roller will never jump the contact points.

Price, \$2.00;
In Canada,
\$2.50

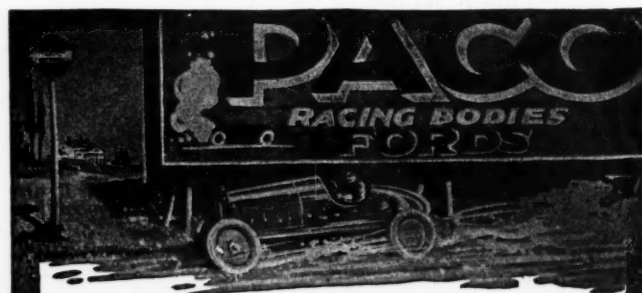


Contacts—Made of high grade steel, case hardened and ground.

Roller Assembly—Made of bronze castings—roller of high grade tool steel, ground and polished to finish.

Dealers: Throughout the WISCONSIN Timer is an unusually well built piece of mechanism. It is a success—a money making proposition for you. Write for our sales proposition.

Wisconsin Timer Manufacturing Corporation
Menomonee Falls, Wisconsin
Sales Dep't—J. Wadsworth Staff
122 S. Michigan Blvd., Chicago



PACO—The Distinctive Body

1919 Exclusive Points

PACO BODIES are back again. They have returned with new features after their withdrawal from sale while all of the nation's steel was being used against the Hun.

Make a snappy, fast and comfortable roadster out of the old Ford by putting on a PACO BODY. Modeled after world's greatest speedcars—long, sloping hood—streamline cowl—low seats and receding rear end—PACO BODIES offer least wind resistance. Designed on scientific engineering lines for speed and comfort.

FREE !!

3-color circular with illustrations from actual photographs of PACO BODIES mailed on request.



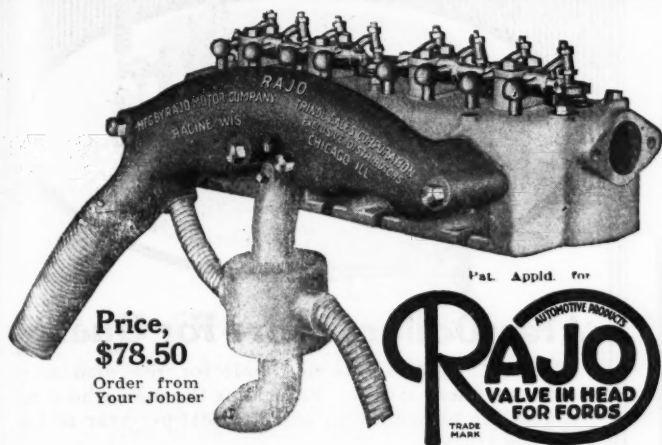
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Send for illustrations and prices of PACO BODIES. Do this today—get full description of these classy racing bodies.

PACO BODIES ARE EXCLUSIVE. We are patentees, sole owners and sole manufacturers of this type of racing body. All designs are fully covered by U. S. Patents granted Jan. 23rd and March 13th, 1917.

See the 1919 PACOS with the new Sport Top and Windshield, PACO exhaust, disk wheels and other features. Send for the FREE Circular. Order an exclusive—distinctive—PACO BODY.

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Price,
\$78.50

Order from
Your Jobber

Dealers: Here It Is!

For Ford Passenger Cars—Roadsters, Speedsters
—Trucks and Tractors

Now is the time to interest Ford Passenger Car, Speedster Truck and Tractor owners in your territory in the RAJO Valve in Head for Fords.

The RAJO is a substantially constructed Head which secures the best possible efficiency from the Ford motor. Insures more power, a smoother running motor, low gas consumption, greater speed and long motor life.

Installed by anyone in three hours without dismantling the motor. A demonstrator will sell 9 out of every 10 Ford car owners in your territory—and the profits are liberal, enough to make every sale worth while.

Our Money Back Guarantee Protects You.

Trindl Sales Corporation

Exclusive Factory Representative
61 E. 24th ST., CHICAGO

HUNT TROUBLE LIGHT



CONVENIENT
NECESSARY
SAFE
EFFICIENT

You wouldn't go out riding without headlights or taillights—then why go without the Hunt Trouble Light? It is just as important in cases of emergency.

You wouldn't dare go near your gas tank with anything but a safe light—that is why you need the Hunt Trouble Light—it is absolutely safe!

It does not take up any extra room. To light up—open the door; to put out—close the door. It is not only a convenience, but it is a necessity.

The light is always on the job and is automatically out of the way when not in use.

There are still some territories open for you, Mr. Dealer and Mr. Agent. Write us now.

HUNT TROUBLE LIGHT CO.

Lima,

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OLD SOL SPOTLIGHTS



"OLD SOL"

No. 76 Liberty Searchlight. Price \$5.50

Combined Push Button switch and focusing control in handle. Wing nut on bracket for inspection lamp. Double clamp bracket. Duplex wire to battery.

Three-inch mirror integral with lamp body, extra large silver plated reflector. Special high candle power bulb. Black enamel finish only.

Diameter of lamp front, 7 in. Weight, packed in 9½x6¼x6¼ carton, 4 lbs.

Made and Distributed by

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Grassmere Avenue

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F. & W. UNIVERSAL NO. 3

F. & W. UNIVERSAL WHEEL AND GEAR PULLER

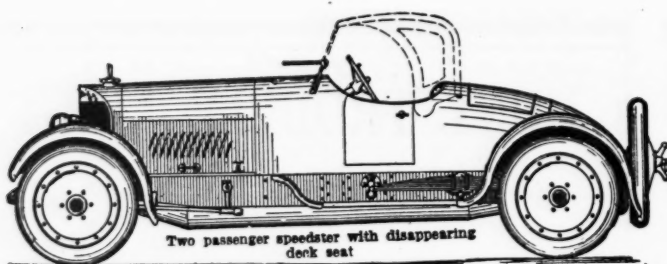
—combines in one tool a device which can be used on any wheel or gear pulling job. Specially designed for automotive use. You need one in your shop. Write now for illustrated booklet.

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Unexcelled in superb finish and skilled workmanship.

A motor car distinguished from all others in design throughout. A pleasure vehicle for those who discriminate and demand distinctiveness.

We specialize in individual design.

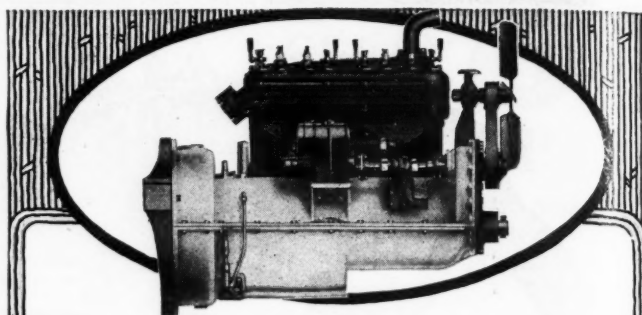
Open models \$5,000.00; closed models \$7,200.00 and up.

Agency inquiries given prompt consideration

SINGER MOTOR CO. INC.,

North Third Ave.

Mount Vernon, N. Y.



A Few Dollars More For Quality

The WISCONSIN is not built for the man who wants a cheap motor. Rather for the man who considers the ultimate cost and the cost-per-year of his car or truck.

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MOTORS

are ready to run when they leave the factory. The price is a trifle higher, because of superior workmanship—adjustments, running-in, testing, rigid inspections. But you save in the end, because the motor is finished.

Write for Specifications.

Wisconsin Motor Mfg. Co.

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Milwaukee, Wisconsin

DISTRIBUTORS:

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California Distributor:
Earl P. Cooper Co., Los Angeles, Cal.
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"Wisconsin"
Power Tested by
Dynamometer

The power output of every Wisconsin Motor is certified with an electric dynamometer. Each must deliver its specified horsepower before it is passed by an inspector.

NEW YORK

AUTOMOBILE REPLACEMENT IGNITION COILS



have actually put hundreds of the smaller Garages and Service Stations in business—and are to-day the most treasured line of the largest Service Stations throughout the U. S.

A special New York Coil engineered to suit the exact requirements of each car manufactured—that will fire the poorest gas—that positively will not "miss" at highest engine speeds and rival magneto ignition is available.

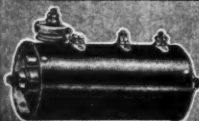
Fifteen years of successful coil building experienced by an organization of Ignition Specialists, is the reason a car owner always agrees when told he needs a New York Coil.

They are installed with no trouble in ten minutes, as they positively fit each car.

More real profit, less come backs and easier made sales than any article you ever handled.

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Gasoline Gauge

Fits the Ford
and
Chevrolet "4-90"



**DEALERS—SELL THIS
SIMPLE, ACCURATE,
GASOLINE GAUGE**

This is a gauge for Ford and Chevrolet "490" cars—and it sells on sight.

Once on, it stays on, and it is the only gauge for Fords on the market that is absolutely accurate—graduated to the contour of a cylindrical tank—not merely to depth.

It screws into the filling hole of gasoline tank "in a jiffy," and tells at a glance how much gas is on hand.

Every Ford and Chevrolet car owner is keen for this gauge. Two types—round or square tanks.

Order through your jobber, otherwise direct. Attractive literature available.

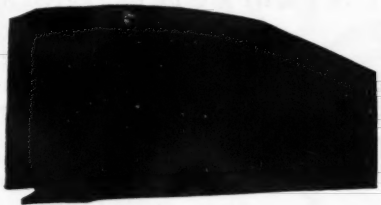
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"Accurate
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KENNEDY Auto Covers

Protect Against Dust, Dirt, Moisture and Cold

GARAGE MAN, HERE IS A REAL BET!

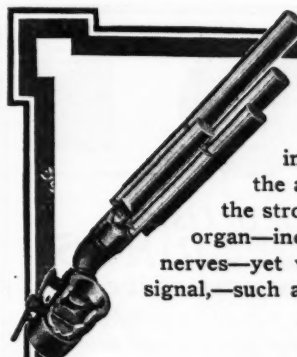
Here is a brand new way to keep your garage filled to its capacity this winter—and, in addition, to get the profitable accessory and repair business that will naturally follow.

For a practically nominal investment you can buy a Kennedy Cover for every car in your garage. Just stop and think how your boarders will appreciate having their cars protected from dust, dirt, rust and cold, with a Kennedy Cover when their cars are standing on the garage floor and for permanent winter storage, you cannot beat Kennedy Covers.

Besides, many owners who keep their cars in private garages will jump at the opportunity of getting a Kennedy Cover. KENNEDY re-sale business pays.

Write today for sizes and prices

THE KENNEDY CAR LINER & BAG CO.
SHELBYVILLE INDIANA



Do you prefer the shrieking, nerve racking blare of the average horn to a horn with the strong, vibrant tone of a church organ—inoffensive to the ears or the nerves—yet very effective as a warning signal,—such a horn as

The **AERMORE**
Exhaust Horn

The Signal with a Smile

Its clear vibrant tone may be heard for at least a mile on country roads—easily discernible above the roar of city traffic.

Constructed on the principle of a pipe organ, having four pipes made of the very best nickel plated brass and equipped with a harmonious chord. Operates from exhaust of engine—eliminating all upkeep cost. Easily installed without having to resort to batteries, wires or movable parts.

Workmanship, quality tone and longevity of the Aermore Exhaust Horn are fully guaranteed.

11 Inch Aermore Horn for Ford Cars..... \$7.00
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15 Inch Aermore Horn for cars of 30 H.P. 9.00
(and up)

THE FULTON COMPANY
1910 St. Paul Ave., Milwaukee, Wis.



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Everyone says so at a glance, and when once installed in your Garage or Shop you would as soon think of keeping your front doors perpetually locked as doing without an

Automatic Extension Reel

For Electric Lamps

Take your lamp to any part of your Garage or Shop, locking and unlocking at any desired point. Automatically rewinds the cord when you are through with the light.

STRONG AND DURABLE. Send for full particulars and prices. Remember that it is not in any way a "half-baked" proposition nor an amateur outfit, but a splendidly constructed and practical piece of mechanism for men who haven't got time to bother with nonsensical makeshifts. Equipped with 25 feet packinghouse cord, handle, socket and lamp guard.

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The **TWITCHELL**
AIR GAUGE

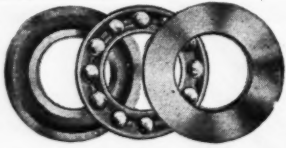
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NO MOTORIST who values freedom from blowouts and long life of tires should be without one. You may think you can guess your tire inflation "near enough," but you can't.

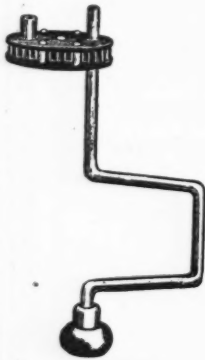
"Near enough" pressure means "near enough" mileage. Measure your air pressure with a Twitchell gauge and get **MAXIMUM** mileage.

At your dealer or

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We Do Not Stock or List
BALL THRUST BEARINGS
 but build them to the requirements of the user
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Removes the FORD FOURTH CONNECTING ROD NUT in three minutes. Made strong—all steel, 3-inch offset. Sent prepaid for \$5.00. Ask your jobber. If he can't supply you, write us

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A SELF-VULCANIZING PRODUCT FOR REPAIRING TUBES AND TIRES. No Heat or Tools required to complete a permanent and everlasting repair.

Motorists are convinced upon the first trial that Perfectfix is their greatest necessity at all times.

Perfectfix is recommended everywhere, therefore a great demand.

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HENRY J. DEWITZ CO. MILWAUKEE, WIS.



Absolutely Accurate Crankshaft Machining

20 years' experience. New Machinery of the latest design. Highest quality work and prompt delivery guaranteed. Ample capacity for large orders.

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Moltrup Steel Products Co. Beaver Falls Pa.

KISSEL TRUCKS



INCOMPARABLE engine ability, axles, springs, brakes and frame of the best material, and above all, unexcelled workmanship, characterize KISSEL TRUCKS.

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BY THE NAME

The original blue sheet. An ideal compressed asbestos packing for any joint. Tenax is permanent whether subjected to gas engine exhaust, cylinder explosions, acid, alkali, superheated steam or any other active agent. Can't burn, rot or squeeze out.

The finest packing made for Automobiles, Tractors, Gas Engines and Steam Engines. Sheets 50 inches square. Thickness 1/32 inch to 1/4 inch, inclusive. Made also in 1/64 inch thickness, black graphited sheet only. Pack with Tenax and forget the joint forever.

Write now for our New Automotive Supplies Catalog or ask your Supply House.

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The Easy Way to Mend Tubes

The Shaler makes perfect tube repairs in 5 minutes. Works automatically—without fail. Burns non-flaming chemical fuel. Makes a permanent "feather-edge" repair, stronger than any "stuck on" patch. Cannot injure tubes. Fits tool box. Saves tubes—saves repair bills.

Complete Outfit \$1.50—At All Dealers
 Price slightly higher west of the Rockies and in Canada. The outfit includes the vulcanizer, 12 patch and heat units, 6 round for punctures and 6 oblong for cuts. Extra patch and heat units—round or oblong, 75c a dozen.
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CHARGE YOUR BATTERIES

**With The Alternating Current
Battery Charger.** ST. LOUIS M. U. RECTIFIER.

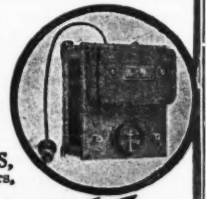
In every community the use of the low voltage storage battery has created a demand for a charging system which can be operated from an alternating current.

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There were 6,353-233 cars and trucks licensed in July 1st, 1919. Thousands are being added to this astounding list every day until the number is now well over seven million. At the present rate it will reach the eight million mark before the end of the year, and still the demand is far ahead of production. And Detroit is the Heart of this tremendous industry.

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Producers, distributors, garages and Service stations are rushed to the limit. This is the greatest, busiest year in the Auto Industry. Everywhere there is a demand for men—trained men who thoroughly understand the operation, care and repair of autos, trucks and tractors.

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PUTS NEW LIFE INTO OLD TOPS

The best \$1.25 you ever spent. One Quart will waterproof your top, and give the original sheen to Mohair.

For Leather and Imitation Leather it waterproofs and gives the original gloss and flexibility to the top.

PROTECT YOUR TOP

For Winter Driving
Easy to apply
Full directions on every can of KNEUTOP

Sent in mailable containers
\$3.25 per gal. \$1.75 per half-gal.
\$1.25 per qt.

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TRADE MARK
PAT. APPL'D FOR

WATERPROOFS FORDS—75c

Efficient, easily attached, it is never taken off and is not in sight.

Permanently ends ignition trouble and makes starting easy in wet weather.

WRITE TODAY—SELLING BY THOUSANDS

PETER GRAY & SONS, Inc., Sole Manufacturers
BOSTON, MASS.

Steel Tires & Mud Chains

TIRE BLOW OUT'S

NO MORE PUNCTURES

Try 2 or 3 sections over any old blowout. Can't have blowouts, punctures; neither can the rubber wear off.

Special prices to those in new territory

Kimball Tire Case Co., 173 Broadway Council Bluffs, Ia.

Mud chains can be put on in a jiffy with one hand while standing on the running board. Hook the ends together and push the little lever. If you get in a mud hole you will laugh out loud.

THE Mercer shield is the badge of fastidious taste in automobile. Mercer means the utmost in substantial smartness, riding comfort, and power. The possessor of a Mercer invariably feels a bit better satisfied than the owner of another car. Correspondence from dealers invited.

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WARNING

That gets action is the only kind that is worth a continental. And the only warning signal that always delivers is the

BUELL EXPLOSION WHISTLE

Attaches to engine in place of priming cup. Adopted by 70 manufacturers. Backed by a 10-year guarantee. Durable, scientifically designed and always effective. Get in touch with us at once.

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THE ONLY SCREW HOLES IN THE WORLD



You drive the screw holes with a hammer in any material. The screw holes are made for wood screws or machine screws to fit all sizes of screws. The head is removed and you leave a permanent screw hole.

The Stine Screw Holes Co.
Manufacturers
WATERBURY, CONN., U. S. A.
DEPARTMENT 5

Once a Screw Hole, Always a Screw Hole

The Biggest Little Thing in the World

Some of the Reasons Why Screw Holes Will Be Bought and Used and Not Become Dead Stock for Anyone

- 1—They can be used without damage to receiving material.
- 2—They enable you to standardize to wood or machine screws in all material.
- 3—They are made of brass and will not rust under atmospheric or moisture conditions.
- 4—ECONOMY—They save more time value than the holes cost.
- 5—You get them for nothing and are paid for using them when you count time saved.
- 6—Screw holes have been needed ever since the first screw was used.
- 7—Special tools are NOT needed in using them in any material.
- 8—They can be used in any place a screw can be used.
- 9—By using screw holes, screws can be used in many places, and in many materials where it is impossible to use screws without them.
- 10—These are the only ready-made screw holes in the world.
- 11—No special screws are needed. These screw holes fit any wood screw or machine screw now in stock.
- 12—They make the neatest possible job in any material.
- 13—Every store where screws are sold must carry them in stock, because the line of screws is not complete without screw holes for them.
- 14—Every shop and factory where screws are used must also have these screw holes to fit the screws.
- 15—They are endorsed by all dealers in screws and by all users of screws.
- 16—Screw holes are entirely new and the world supply is yet to be furnished.
- 17—This is a progressive Old World of ours, and every active person in it must adopt all improved methods, and all new articles that will help him keep in the front line of progress.
- 18—Be among the first to stock up in screw holes if you are a dealer in screws.
- 19—Be among the first to install screw holes in your shop or factory, as you begin to save money soon as you use them.
- 20—In spite of the high cost of brass, screw holes are yet cheap.
- 21—We are letting the world know that screw holes can now be secured, by means of extensive advertising, in all the principal Trade Journals that have the largest circulation among dealers in screws as well as users of screws.
- 22—Do not let your customer ask you for screw holes before you have them in stock. BE A LIVE WIRE.
- 23—They make everlasting holes in any material.
- 24—They mean "Plug-No-More" screw holes.
- 25—They are the result of Necessity being The Mother of Invention.
- 26—Anyone who can drive a nail can use screw holes.
- 27—Send for a sample and convince yourself.
- 28—Mechanics who see them say, "What do you think of that?"
- 29—In fact there are NO REASONS why screw holes should NOT be used.

Each of these reasons are enough to sell Screw Holes. There are many other reasons. Write at once for our handsome Color Card showing screw holes in various materials which will be sent on request, together with samples and price list.



Seamless drawn steel, tinned and tested.
Service-proved and endorsed by experienced motorists everywhere.
Send for detailed literature.

JANNEY, STEINMETZ & COMPANY
Main Office, Philadelphia
New York Office, Hudson Terminal Bldg.

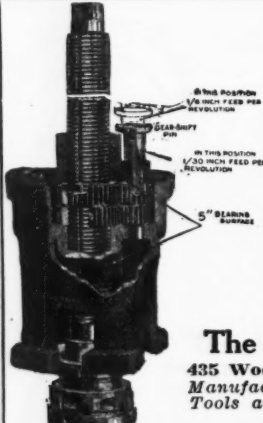
Cooper **"SPECIAL" CUTOUT**
"Feels the Pulse of the Car"



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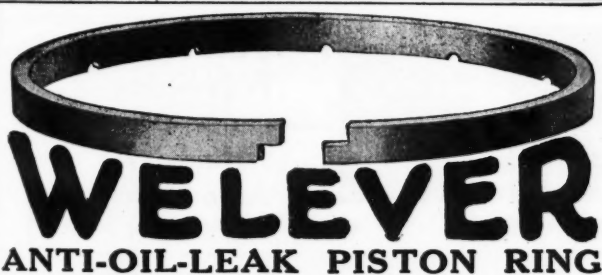
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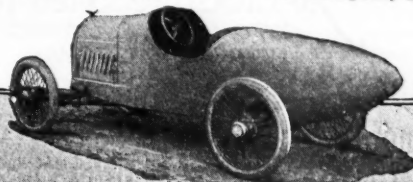
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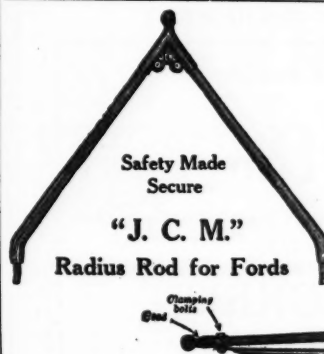


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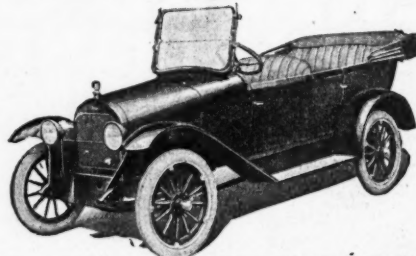
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AIR COMPRESSORS
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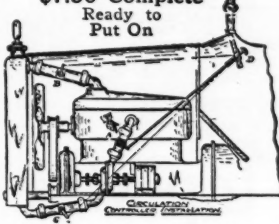
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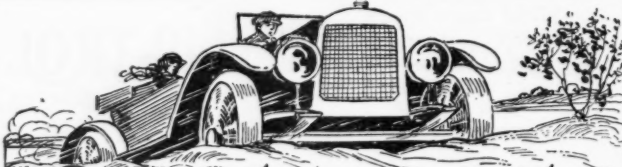
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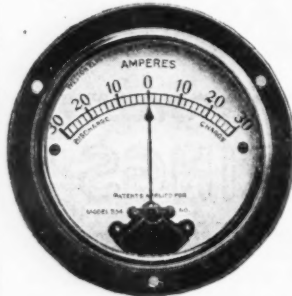
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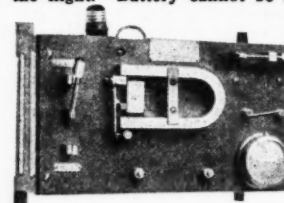
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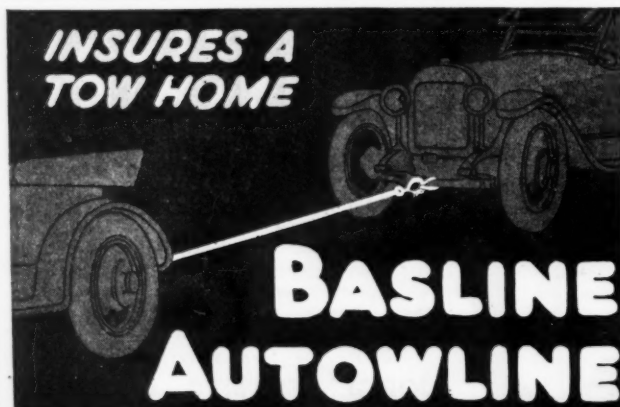
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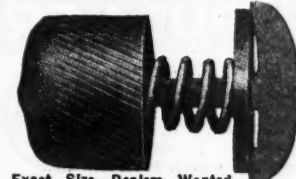
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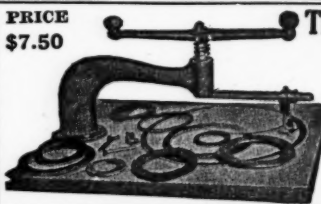
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With patented reverse taper construction and hub-cap wedges, wheel positively cannot come off by accident. Safety, beauty and comfort. Saves tires. Quick, easy changes. Set 5 wheels, \$70. Order through Ford dealer. Write for further information or dealer's proposition.

Stewart Wire Wheel Corporation

401-437 W. Barnard St., Frankfort, Indiana, U. S. A.

The Stewart Hub Makes Safety Sure

AUTO LAD

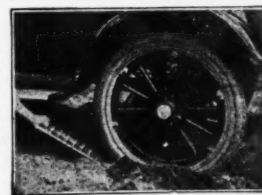
3 IN 1 TROUBLE TOOL

Prevents wheels spinning when car is stuck in mud, gravel, sand or snow. Forms perfect traction. Makes bad roads safe. Does not damage tires. Also used as shovel and as a firm foundation for a jack. Price \$1.50. Order a sample and details of our dealer proposition.

ALSTEEL MFG. CO.,

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The Motor Truck bought today without Electric Starting and Lighting will be out of date to-morrow

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Internal Gear Drive
MOTOR TRUCKS
Dependable Delivery

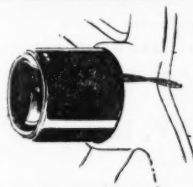
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H. W. JOHNS-MANVILLE CO.
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10 Factories—Branches in 63 Large Cities



**"Simplex" Steering Wheel Horn
Push Button for**

Dodge, Maxwell, Harroun, Ford, Briscoe
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Retails for 50c; Snappy in appearance,
substantial in construction.

Liberal Discount to Dealers and Jobbers
SIMPLEX ELECTRIC MFG. COMPANY

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**The Federal
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150 No. Elm St.
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Inner armor
for automobile

INSYDE tires pre-

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tures and blow-outs.

Double mileage of any tire, old

or new, easily applied without tools.

Used over and

over in several tires. Will not heat or pinch.

Cheaper

and better than double treads, etc.

Details free.

Distributors and agents wanted.

Sales guaranteed.

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Save 25% to 40% of Gasoline

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Bulldog Tread — Non-Skid
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RUNS THE FORD ON KEROSENE

Dealers—Here is a new big seller with liberal profits that lead to
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WESTERN CARBURETOR CO.

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Should be regular equipment on YOUR CAR

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ENGINE DRIVEN
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of auto supplies who have a fixed territory
which they systematically cover are offered to SELL on a liberal commission
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It is an instrument which sells for One Dollar. It is on the market only two
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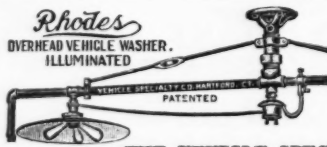
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Sensible-Logical-Inevitable

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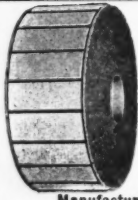
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Water and light where
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All joints guaranteed

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Tire Dressing Wheel

Equipped with removable blades having two wearing
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rubber, for retread and half sole work.
Price \$15.00. Extra blades \$3.00 per set.

Write for circular. Sold by all jobbers.

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Has a core of acid-flux right in it. Eliminates
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Products of the improved Gillette Chilled Rubber
Process. Refining treatment that toughens rubber
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The HUFFMAN TRUCK

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The Lowest Priced Truck in America for Its Carrying Capacity

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**Whirlwind
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Your customers cannot afford less efficient accessories. To serve their best interest sell the Whirlwind Pump and Peteler Jack

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America's Supreme
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Best for Motor
Car and Garage
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Price \$2.50

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Exclusive territory.

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A Strong, Beautiful Steel Wheel That Won't Buckle and Can't Collapse, and That Affords the Resiliency Necessary to the Ultimate in Car Comfort.

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Offers an almost unlimited opportunity for dealers
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The only one man heavy duty Grease Pump on the market.

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The Warman Radiator Guard for trucks guarantees protection against radiator injury, the result of collision. Its basic patent design makes it the strongest guard on the market. Saves the truck owner new radiator or repair expense. More important, it prevents expensive lay-ups while new radiator is being shipped or repairs made at a distance. A direct-to-the-dealer proposition that is worth while. An interesting manufacturer proposition on stock equipment. Get the details.

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Cut Hauling Costs
and speed up deliveries with Watson
Trailers. They are producers.
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WATSON Trailers



CLEOLINE

A new chemical compound when applied to a windshield will keep it free from rain, sleet and snow. 75c per can.

WITHOUT

Manufactured by THE CLEOLINE CHEMICAL COMPANY, Inc., 607 10th Avenue, New York

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GEARED TO THE GROUND
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The most powerful hauling machine in the world. Makes all roads good roads. Capacity four times its own weight. Standard specifications. Catalog.

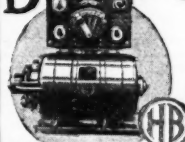
LINN MFG. CORP., Morris, N. Y.

Materially Reduces Operating Time of Self-Starter—
Makes Cranking a Matter of a Very Few Turns Even in Coldest Weather

AND so the B & L Electric Primer merits the close investigation and rigid test of every car and truck engineer who is seeking the advertising and selling points that go with high efficiency.

THE AUTO DISTRIBUTING CO.
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HB Battery Charging Equipment will pay \$100 to \$400 a month CLEAR EXTRA PROFIT, depending upon size charger used. Motor Generator Type. No burn-outs or expensive renewals. No electrical knowledge required to install or operate. Gives sure, steady service with BIG PROFITS, 24 hours a day. We furnish also HB Ball-Bearing Motors, Generators, Belted Equipment, etc. All HB Equipment absolutely guaranteed. Sold on easy payments. Write for prices, terms and full information to:

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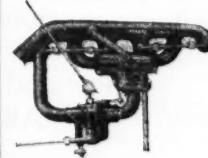


Joly--The Spark Plug with an Unsurpassed Air Record

Over 5,000,000 used by the Allied Air Forces. On duty for four years on every allied combat airplane. Now made in the United States for Truck, Tractor, Passenger Car, Gas and Airplane Engines. Unsurpassed in design, construction and endurance. Don't tie up on a spark plug contract till you get "Joly" facts and figures. A fast seller on reputation and performance. Write

LYONS IGNITION COMPANY

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HOAG MANIFOLD SUPERHEATER

DEALERS:—This device heats the intake manifold to a point where complete vaporization of fuel is assured even in coldest weather. The heated gases from the exhaust manifold do the work. A Ford necessity that increases mileage, cuts down fuel consumption, gives more power and minimizes carbon. A quick seller that satisfies the Ford owner and yields splendid profits. Write for the proposition.

THE HOAG SUPERHEATER COMPANY,
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A Few Live Dealers Wanted for MUTUAL

"America's Greatest Truck"

2-3½ and 5-ton, with Electric Light, Enclosed Cab, and Metal
Wheels as part of regular equipment.

MUTUAL TRUCK CO.

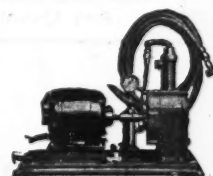
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The "LongStroke" COMPRESSOR

(Write for descriptive folder)

MOTOR-COMPRESSOR CO.

52-60 Dickerson Street, Newark, N. J.



THE CLEARING HOUSE OF THE MOTOR INDUSTRY

FOR PARTS, ACCESSORIES, TIRES, MACHINERY, REBUILDING, REPAIRING, WELDING AND USED CARS. ALSO HELP AND SITUATIONS WANTED AND MISCELLANEOUS CLASSIFIED ADVERTISING

IF IT'S AUTO PARTS YOU WANT Wire-Write or Come to Warshawsky—

Every Used Part Is in First Class Condition, and Will Render Satisfactory Service. If We Cannot Satisfy You, Your Money Will Be Cheerfully Refunded

SPECIAL MOTOR BARGAINS

All in Excellent Condition
UNIT POWER PLANTS

Stearns Knight 8 with starter and generator complete.....	\$225.00
New Keystone 6 cyl.....	200.00
Stearns Knight 4 cyl.....	150.00
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Hershoff Spillman 6 cyl.....	175.00
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Haynes 4 cyl.....	125.00
Allan 40 4 cyl. with gen.....	125.00
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Lozier 4 cyl.....	100.00
Wisconsin Out of Cutting 4 cyl.....	100.00
Menominee 4 cyl.....	100.00
Rutenber 4 cyl.....	100.00
Master 6 Chalmers 6 cyl.....	125.00
Knox 6 cyl.....	175.00
Haynes 6 cyl. with starter and generator.....	175.00
Patterson Northway 4 cyl.....	125.00

MOTORS—ONLY

Marmon 32 with starter and generator.....	\$150.00
Hudson 6 cyl. 6-54.....	125.00
Peerless 6 cyl.....	125.00
Premier 6 cyl.....	100.00
National en-bloc.....	125.00
Northway 6 from Cole with centre control, starter and generator.....	150.00
Rutenber 6 cyl.....	125.00
Continental with starter.....	125.00
Rutenber 6 out of Auburn.....	125.00
Mitchell T Head 6 cyl.....	125.00
Alco 6 1/2 Ton Truck.....	150.00
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Continental R 4 cyl.....	100.00
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Premier 4 cyl.....	100.00

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BOSCH
MAGNETOS
Hair and Leather in
Any Quantity

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Wagner 13 Studebaker.....	25.00	Remy 5, 6, 3. SJ2, 535.....	35.00
Jesco.....	25.00	Disco 16 E—12 volt.....	35.00
20 Delco.....	30.00	Apple, Mod 28 A.....	25.00
Gray & Davis 2 Unit.....	35.00	Intz Chalmers.....	35.00
Westinghouse S W 1158 A.....	30.00	Northeast.....	20.00
New Remy Model 180B 6 volt Starter and Generator.....	60.00	Apple—A28 for Mitchell.....	25.00

MAGNETOS

Overhauled and Guaranteed

New DU4 Variable.....	\$35.00
DU4 Bosch Set Spark.....	25.00
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DU6 Bosch.....	32.50
DR4 Bosch.....	20.00
DR4 Bosch 2 spark.....	65.00
DR6 Bosch.....	25.00
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D6 Bosch.....	17.50
D6 Bosch 2 spark.....	45.00
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ZIR4 Bosch 2 spark.....	100.00
Eisenmann Dual.....	15.00
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New Dixie Mags. 4 cyl.....	18.00
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Mea.....	12.00
New Splittorf Type E.....	12.00

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Bosch Type A.....	\$7.50
Bosch Duplex.....	4.00
Eisenmann.....	4.00
Splittorf.....	4.00
Silent Starter and Generator Chains; all lengths and sizes.....	
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Westinghouse with distributor 230-221.....	25.00
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New Westinghouse 209 R.....	20.00
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Ward Leonard AG T.....	10.00-12.00
Splittorf.....	12.00
Vesta.....	12.00
Berdon.....	10.00
Delco Oakland.....	10.00
Bijur, Series 51-30-5.....	15.00
Ward Leonard for King.....	15.00
Rushmore No. 1.....	15.00

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Bijur Apperson.....	25.00
Allis Chalmers.....	15.00
Remy 182.....	20.00
Packard.....	20.00
Deaco.....	20.00
Starter for Palmer Singer.....	20.00
Westinghouse 533-S W 103.....	25.00
Allis Chalmers.....	15.00
Wagner for King.....	20.00
Autolite No. 7040-2407-6145.....	15.00-20.00
Autolite for Abbott.....	15.00
Gray Davis Chalmers.....	20.00
Leece-Neville Haynes.....	20.00
Gray Davis, Lozier and others.....	30.00
Autolite, Overland 79, 81, 82.....	15.00-20.00

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Stewart or Warner.....	\$1.50 to \$4.00
New Stewart flush type.....	5.00
Pyrene Fire Extinguishers.....	6.00

DEPOSIT REQUIRED
WITH
ALL ORDERS

COMPLETE LINE OF NEW PARTS For All Standard Makes of Cars NEW & USED GEARS & BEARINGS

Specials in New Parts and Material

New 1 and 1 1/2 ton truck bodies.....	\$60.00	New Hand Horns.....	\$2.00
New Channel Bar Black Bumpers for Fords.....	3.50	Double Barrel Pumps.....	2.50
New Channel Bar Bumpers for all cars, black enamel or nickel.....	4.50	Single Barrel Pumps.....	1.50
New Autolite ammeters, 20 amp., \$1.50; 30 amp.....	2.00	Head Lights for Fords, Pair.....	3.50
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Connecticut 3-button switches.....	1.75	Top Dressing, 1/2 pt. can.....	.35
National Standard Medium Jacks.....	1.50	Ray Shock Absorbers, for Fords, set of four.....	5.00
Heavy Grease Guns.....	.50	Radiator and Hood Covers, for all cars.....	5.00
14,000 ft. new radiator hose. Price per ft., 1-in., 15c; 1 1/4-in., 17 1/2c; 1 1/2-in., 20c; 1 3/4-in., 22c; 2-in., 25c; 2 1/4-in., 27 1/2c; 2 1/2-in., 30c; 2 3/4-in., 32 1/2c.....		NEW LAMPS 11 inch single bulb.....	\$6.00
Tortoise Shell Goggles.....	\$0.35	10 inch single bulb.....	5.00
New Johnson Shock Absorbers, complete, per pair.....	\$10.00-12.00	Electric tail lights.....	.85
Master Vibrators for Fords.....	3.00	Electric side lights, pair.....	1.75
New Bailey Differentials for Overland Models 80, 81, 83.....	\$10.00	NEW BRAKE LINING Price per ft. 1 1/4-in., 20c 1 1/2-in., 25c 1 3/4-in., 30c 2-in., 30c 2 1/4-in., 45c 2 1/2-in., 50c	

PREST-O-LITE TANKS

Model B.....	\$5.00 each; E.....	\$3.50 each
Searchlight Tanks.....		\$2.50

New and Used Rims—
All Makes

New Pneumatic and Solid Truck Tires GOOD USED TIRES AND TUBES OBTAINED FROM WRECKED CARS

WRITE FOR PRICES

30x3.....	\$1.75	34x4.....	\$3.00
30x3 1/2.....	2.00	36x4.....	3.50
32x3 1/2.....	2.25	36x4 1/2.....	3.25
32x4.....	2.50	36x4 3/4.....	3.50
33x4.....	3.00	37x4 1/2.....	3.75

NEW
RELINERS

MAIL ORDERS SHIPPED SAME DAY
HIGHEST PRICES PAID FOR WRECKED CARS

WARSHAWSKY & CO. LARGEST CAR WRECKERS IN THE WORLD

1915 SOUTH STATE STREET

PHONE CALUMET 7315

CHICAGO, U. S. A.

PARTS FOR ALL CARS

We Save You 50 to 80% of the Original Cost

Satisfaction or
Your Money Back

New Spotlights, 5 in. lens with
mirror \$3.48

Prest-O-Lite Tanks

Model B.....\$5.00 ea.

Model E.....3.50 ea.

Searchlite Tanks 2.50 ea.

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Bosch Type A.....\$6.50

Eisenmann.....3.50

Splitdorf.....3.50

STARTERS

Gray & Davis.....\$14.00

Auto Lito, Bendix Drive.....17.50

Jones Starter and Generator.....20.00

GENERATORS

Gray & Davis.....\$14.00

Remy.....12.00

Vesta.....10.00

Silent Starter and Generator

Chains, all lengths and sizes.

Lighting and Starting Bat-

teries \$6.00 to \$15.00

Rims 1.50 to 3.50

Carburetors 3.50 to 7.50

5% Off for Cash in
Full with Order.
Deposit Required
with All Orders.
Get Our Prices on
New Tires.

Magnetos Overhauled and Guaranteed

Bosch DU4 Variable.....\$27.50	Bosch DR4.....\$19.50	Bosch D6.....\$15.00
Bosch DU4 Set Spark.....25.00	Bosch DR6.....20.00	Eisenmann.....12.00
New Bosch DU4 Variable.....35.00	Bosch ZR6.....35.00	Remy.....6.00
Bosch DU6.....29.00	New Bosch ZR6.....40.00	Dixie.....12.00
	Bosch D4.....14.00	

OUR SLIGHTLY USED TIRES AND TUBES OBTAINED from WRECKED CARS Mean Economy to You—A Trial Will Convince You

Size	Tires	Tubes
30x3	\$4.50	\$1.35
30x3 1/2	5.50	1.45
31x3 1/2	5.75	1.50
32x3 1/2	6.00	1.50
32x4 1/2	6.50	1.60
31x4	7.00	1.65
32x4	7.75	1.60
33x4	8.50	1.70
33x4 1/2	9.00	1.75
34x4	8.50	1.70
35x4	9.00	1.75
34x4 1/2	9.00	1.75
35x4 1/2	9.25	1.80
36x4 1/2	9.50	1.85
38x4 1/2	15.00	2.50
40x4 1/2	15.00	2.50
42x4 1/2	25.00	4.00
35x5	10.25	2.00
36x5	10.25	2.00
37x5	10.75	2.20
38x5 1/2	15.00	2.50
38x5 1/2	15.00	2.50
40x4 Non Skid	15.00	2.50
43x4 1/2 Cl. Non Skid	15.00	2.50

Express Must Be Prepaid on Old Tires Sent to Us.

Special New Clincher Tires

32x4.....\$10.00	33x4 1/2.....\$12.50	34x5.....\$12.50
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Double Tread Tires

Selected from best used material obtainable.

Reliners Free with Each Tire

Two tires, one with good top and other with good sidewalls are trimmed, cemented and sewed firmly together by Campbell lock stitch method, twelve to fourteen plies fabric making puncture and blowout almost impossible.

Size	Complete	You furnish one tire	You furnish both
28x3.....\$4.15	\$3.00	\$1.50	
30x3.....4.75	3.35	1.50	
30x3 1/2.....5.80	4.25	2.00	
31x3 1/2.....6.50	4.50	2.00	
32x3 1/2.....6.75	5.25	2.00	
32x4.....7.00	5.60	2.25	
33x4.....6.95	5.75	2.50	
32x4.....7.15	5.65	2.50	
33x4.....7.80	6.25	2.50	
34x4.....8.00	6.45	2.50	
35x4.....8.75	7.15	2.50	
36x4.....9.40	7.50	2.50	
33x4 1/2.....9.25	7.60	3.00	
34x4 1/2.....9.65	8.00	3.00	
35x4 1/2.....10.15	8.20	3.00	

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Guaranteed for 6 Months
6 Volt Starting and Lighting
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Roller Ball Bearings (All Makes),
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We Have Parts of All the Following Cars Now on Hand

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E M F 30
Everett 30
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Pullman
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Buy your repair parts direct from
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We secure all parts from the same
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Shipments promptly and correctly
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200 Stromberg Carburetors, K-1, 1-in.	8.00
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10,000 Hardened Set Screws, 5-16-in. and 3-8- in., 1-inch to 2-inches long, per hundred	1.00
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Speedster Radiators	9.00
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For Over 100 Different Makes
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New Gears and Shafts for 200 Cars. Prest-O-Lite Tanks, Model B, \$5.00; Model E, \$3.50. Searchlight Tanks, \$2.00.

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Stearns-Knight, fully equipped, Bosch Dual magneto, Vesta generator, Rayfield carburetor, ammeter, and all switches and gauges, complete	200.00

This motor is worth \$1250.00 and is as good as new

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We specialize in automobile parts.

We carry parts in stock for more than a hundred makes of cars. Our stock for the following fifteen makes is exceptionally complete: Chalmers, Studebaker, Chandler, Olds—4 and 8 cylinder, Dodge, Buick, Cadillac, Maxwell, Reo, Elcar, Paige, Overland, all models, Mitchell, Hudson, and Hupmobile, all models.

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J. I. Case 40	Moon 40
Carter Car 5A-L-R	Mason "May Tag" 4 cyl.
Chalmers F-K-L & Six 10-11M-18—Clark 40	Monarch 40—Moline
Cadillac 1909-1910	Monroe
Cameron—Crawford	Overland 30-32-35-38-41-42-52-56-59-69-71-75BB-79-81-83
Detroit—Enger 40	Oldsmobile 40
E. M. F. 30—Fal Car	Oakland 2 & 4 cyl. 30-40
Flanders 2 & 3 speed	Packard 1910—Premier
Firestone Columbia	Paige Detroit 25 H. P.
Fuller	Pullman 40
Ford—N. R. & S.	Reo 2 & 4 cyl. 4th & 5th
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Complete Motors, Transmissions and Rear Axles. Money refunded on all parts within 10 days if unsatisfactory.

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FOR ALL MAKES OF CARS

Transmission and Differential Gears

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Also Axles, Universal Joints, Clutch Parts, etc. Lowest prices consistent with quality and

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For All Cars
SPECIALS FOR FORDS

Complete Roof and Back, Ready to Put On. Roadster Touring ONE MAN Touring Tops, complete. SEAT COVERS Roadster Touring

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110-Volt 60-Cycle A. C. Sets with panel—	
250 Watt	\$ 83.00
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Speed or Power

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INSTALL A SET OF:

2 3/4—1 Gears in the Race Type
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OUR TRADE MARK—A star on every gear insures quality

All ratios \$15.00 set.

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When you are in the market for Anything for the Automobile
New and Used
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Speedster Bodies \$ 65.00
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Motors	\$25.00 up	Presto Tanks	\$ 4.50 up
Magnetos	4.00 "	New Spotlights	2.00 "
Carburetors	3.00 "	Generators	10.00 "
Rear Axles	15.00 "	Gears	1.00 "
Front Axles	5.00 "	Bearings	1.00 "
Cylinders	5.00 "	Radiators	10.00 "

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AUTO SALVAGE & WRECKING CO.

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ALWAYS TEARING 'EM UP—
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PARTS FOR
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Magnetos,
Gears, Motors,
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BARGAINS
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USED PARTS AT BARGAIN PRICES

We have a large stock of parts now on hand for immediate shipment. Prompt service and honest methods have built up our business. We guarantee every part we sell and refund your money if you are not satisfied. Orders shipped same day received. Send us a trial order.

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 Cadillac—10 Gay Truck— Rambler—10
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 Model 17 Imperial—34 Saxon—Baby 4
 Chevrolet— Jackson—52 Saxon—4 6
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Special Attention to Magneto, Generator and Starter Service

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Studebaker frame, block, parts and pieces; Ford frames, blocks, parts and pieces; under ground gaso-line tank and pump, \$75 (complete); several oil tanks \$3.50 each; Hudson, Mitchell, Klein, Ford and Chevrolet rear ends; fine panel truck body; several auto bodies; Dodge, Paige, Studebaker, Buick, Ford and several truck radiators, auto gas tanks; Presto tanks; seat cushions, windshields; any size new or used inner tubes; starters; generators; high tension magnetos; coils; carburetors; solid tires, any size rim; any size new or used tire; any size, type or style rebuilt battery; any size truck or auto spring; vises; anvils; jacks; pumps; Ford or Auto mud guards; lamps, head lights, bumpers. Several fine autos for sale at bargain prices; fine line of auto bodies; Winton front axle, body and crank shaft; Atterbury truck, crank shaft. Buick housing, crank shaft, gears and axles.

One-third to one-half off (used but good as new). Blocks, heads, crank shafts, housings, gears, wheels, axles, pieces, parts, frames. Write or wire.

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We carry a large stock of used parts. Try us when in need the next time. You'll find your interests are ours. Prices low as quality permits.

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CRAIG-HUNT Parts are the safest and BEST COMPLETE SET, for lowering the Ford Frame \$25.00

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\$100 Underslung parts with body free, or parts alone, \$12.50 per set.

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160 DIFFERENT MAKES CARS IN PARTS
 SEND US YOUR OLD PIECES
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 We carry a large line of parts of late model cars and are in position to give you satisfaction. Our prices are 50 to 75 per cent below manufacturer's list. Send us your next order and let us demonstrate.

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THOSE OLD TIRES!

They can be DAVID-RIBBED retreaded at about half the cost of a tire. Not a half-sole or inner liner proposition. We remove all the old tread rubber, and rebuild the tire ply upon ply with raw gum—then cure it by the Zwebell Dry Cure Process.

3500 MILE GUARANTEE

28x3	\$ 8.50	35x4	\$19.00
30x3	9.50	36x4	19.50
30x3½	11.75	32x4½	20.75
31x3½	12.25	33x4½	21.25
32x3½	13.75	34x4½	22.25
34x3½	14.75	35x4½	22.75
31x4	16.70	36x4½	24.25
32x4	17.00	37x4½	24.75
33x4	17.50	38x4½	26.50
34x4	18.50	36x5	27.00
37x5			27.50

The above prices include a 2-ply reliner vulcanized in the tire. Send us your tread-worn tires, and the same tires will be DAVID-RIBBED RETREADED and returned to you. We pay express or Parcel Post charges one way. Correspondence invited. If your tires are unfit for retreading, we have your size in stock.

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Tires & Tubes

Slightly used and factory repaired tires and new tubes—quality above all.

A Satisfied Customer Is Our Biggest Asset—Therefore, We Must Satisfy You

Size	Used Tire	New Tubes	Size	Used Tire	New Tubes
30x3	\$4.00	\$1.95	35x4	\$ 8.25	\$3.50
30x3½	5.00	2.30	36x4	10.00	3.75
31x3½	5.25	2.35	34x4½	8.50	4.15
32x3½	5.50	2.40	35x4½	8.75	4.25
34x3½	7.00	2.60	36x4½	9.00	4.40
31x4	6.50	3.00	37x4½	12.25	4.50
32x4	7.25	3.05	35x5	9.75	4.60
33x4	8.00	3.25	36x5	9.75	4.70
34x4	8.00	3.40	37x5	10.00	4.75

Send \$1.00 deposit with each tire ordered. Tires will be sent promptly C. O. D. with privilege of examination. Specify style of rim to avoid delay.

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Demonstrating

All Non-Skid TIRES All Non-Skid

They Are MUCH BETTER
 Than the Ordinary Used Tires

Size	Tire	Tube	Size	Tire	Tube
30x3	\$ 6.50	\$1.75	33x4½	13.50	2.50
30x3½	7.50	1.90	34x4½	13.50	2.60
32x3½	9.00	2.00	35x4½	14.00	2.65
31x4	9.50	2.15	36x4½	15.00	2.75
32x4	10.50	2.15	38x4½	22.00	...
33x4	11.50	2.25	35x5	15.50	2.85
34x4	12.50	2.35	37x5	16.50	2.95
32x4½	13.00	2.35	37x5½	18.00	...
			38x5½	25.00	...

5 Per Cent Off for Cash in Full with Order. Otherwise, goods shipped C. O. D., subject to examination. Specify whether clincher or straight side.

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40% Discount

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Are highly serviceable if cured in the proper mold. In buying your new mold be sure the S has: FIVE CLAMPS. Less clamps can't give the proper pressure.

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We also carry a complete stock of New Tubes at factory prices.

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28x3	\$4.75	\$1.50	34x4	\$ 8.25	\$2.35
30x3	5.00	1.65	37x4	10.75	2.50
30x3½	6.00	1.70	34x4½	9.75	2.50
31x3½	6.25	1.80	35x4½	10.00	2.50
32x3½	6.50	1.80	36x4½	10.50	2.50
34x3½	7.50	1.80	35x5	11.25	2.50
31x4	7.50	2.10	36x5	11.50	2.60
32x4	7.75	2.20	37x5	11.75	2.60
33x4	8.00	2.25			

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Also a complete stock of new Tubes at factory prices.

Size	Tire	Tube	Size	Tire	Tube
28x3	\$4.75	\$1.50	34x4	\$ 8.25	\$2.35
30x3	5.00	1.65	37x4	10.75	2.50
30x3½	6.00	1.70	34x4½	9.75	2.50
31x3½	6.25	1.80	35x4½	10.00	2.50
32x3½	6.50	1.80	36x4½	10.50	2.50
34x3½	7.50	1.80	35x5	11.25	2.50
31x4	7.50	2.10	36x5	11.50	2.60
32x4	7.75	2.20	37x5	11.75	2.60
33x4	8.00	2.25			

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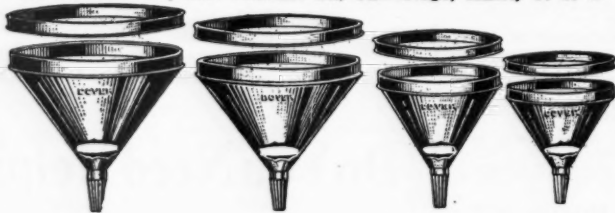
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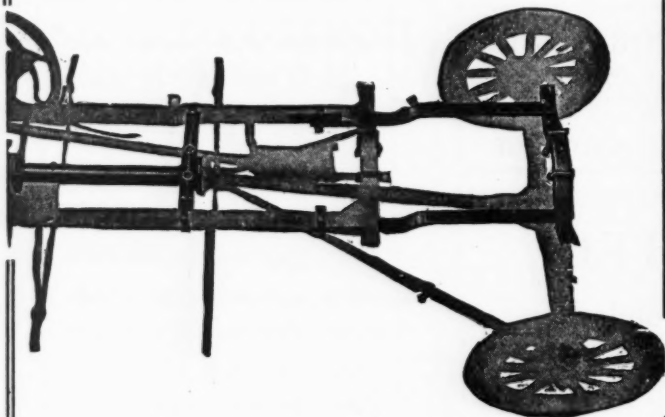
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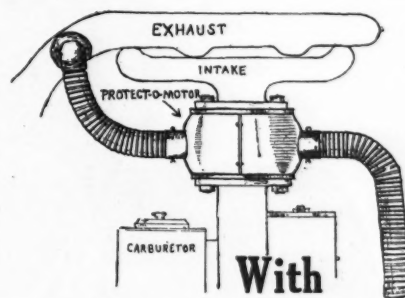
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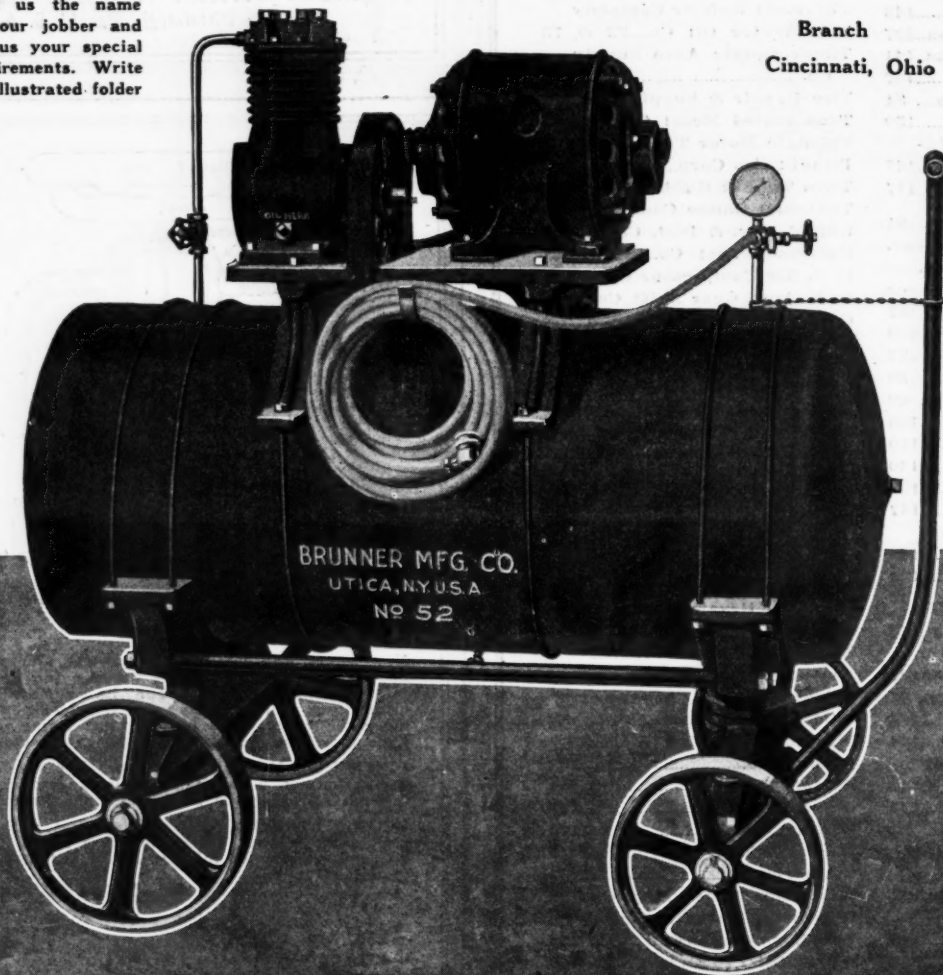
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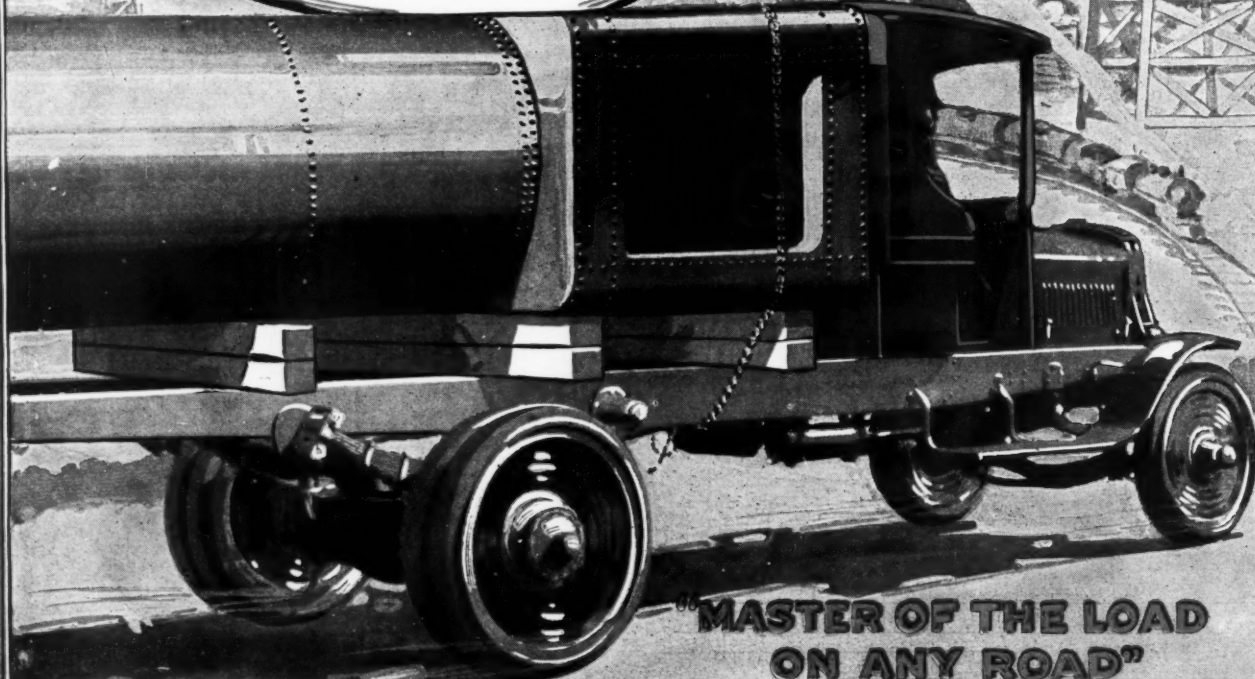
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